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BOWLES RESIGNS; CAPPS SUCCEEDS HIM.

Announcement was made this week by Secretary Moody of the navy department that Rear Admiral Francis Tiffany Bowles,



Rear-Admiral F. T. Bowles.

chief constructor of the navy, had resigned his commission in the service, and that Naval Constructor Washington Lee Capps would be appointed to succeed him. Admiral Bowles' resignation is to take effect on Nov. 1. He is leaving the service to become president of the Fore River Ship & Engine Co., Quincy, Mass., which is engaged in building the battleships Vermont and New Jersey, the protected cruiser Des Moines and the destroyer MacDonough. Secretary Moody said in making the announcement that President Roosevelt and himself had accepted the resignation with profound regret. Admiral Bowles said in explanation of his action that while his service of twenty-eight years in the navy and his work and surroundings had been very agreeable the offer from the Fore River company, which would enable him to help build up a New England enterprise and be near his Massachusetts home, furnished opportunities which he could not overlook.

The new chief constructor and chief of the bureau of construction and repair is less than forty years old and will be the youngest naval officer who has attained the rank of rear admiral, which he will hold for his four years' term as head of the construction department of the navy. In succeeding Admiral Bowles Constructor Capps will be promoted over six numbers of his corps. He was born in Virginia on Jan. 31, 1864, and appointed to the naval academy from that state in 1880. After his graduation he was sent to Glasgow to study naval architecture for two years, and in 1886 was appointed as assistant constructor. His work in the navy has been regarded as brilliant and won him the flattering assignment of superintending construction of the 16,000-ton battleship Connecticut, which is being built by the government at the Brooklyn navy yard, where Mr. Capps is still on duty.

Admiral Bowles was born in Massachusetts on Oct. 7, 1858, entered the naval academy in 1875, and after graduation as a cadet engineer, went abroad to study naval architecture. Although little more than a boy, he was instrumental in the organization of the new construction corps and was one of the first two naval academy graduates to enter it. He built the battleship Texas at the Norfolk navy yard, staking his professional reputation that the vessel would be seaworthy and efficient in the face of widespread criticism of his plans, which had been purchased in England. At the time of his appointment in March, 1901, as chief constructor of the navy he was in charge of the construction department of the New York navy yard. His ability has made him noted throughout the naval world.

Admiral Bowles stated emphatically that his resignation had no connection whatever with the mention of his name, in the proceedings in New York for the appointment of a permanent receiver for the United States Ship Building Co., as one of those listed by John W. Young to receive cash, bonds and shares of the company for "promotion." He said that in 1899 he had been

employed by Alexander & Green, the promoters of the proposed United States Co-operative Ship Building Co., to appraise ship building plants, but had never been paid for the work. He was then on duty as a constructor in the Brooklyn navy yard. In 1902 Lewis Nixon had asked him to buy stock in the United States Ship Building Co., but he had declined, and John W. Young, who had written that he had reserved certain stock for him to buy, had been told by Admiral Bowles that he didn't want it. He said that his resignation is caused by his desire to better himself financially and to have a permanent home in Massachusetts. The secretary of the navy put a quietus upon the whole affair by saying that if Admiral Bowles asked leave to withdraw his resignation it would be accepted with alacrity.

FASTEST BATTLESHIP OF THE NAVY.

The battleship Missouri, built by the Newport News Ship Building & Dry Dock Co., Newport News, Va., has earned the distinction of being the fastest battleship in the navy. She covered the distance over the Cape Ann course in 3 hours, 29 minutes and 24½ seconds, an average of 18.05 knots elapsed time and 18.22 with tidal correction. During the trial the highest speed attained was 18.5 knots, the highest number of revolutions per minute 121 and the average 117. Following is a table showing more minutely the record of the run:

First leg.		Second leg.	
Buoy 1.....	11.13.50	Buoy 6.....	1.23.50
Buoy 2.....	11.36.10½	Buoy 5.....	1.45.52
Buoy 3.....	11.58.35	Buoy 4.....	2.06.50
Buoy 4.....	12.21.45	Buoy 3.....	2.27.55
Buoy 5.....	12.44.05	Buoy 2.....	2.49.05
Buoy 6.....	1.06.05	Buoy 1.....	3.10.52

The time elapsed in the first leg was 1 hour, 52 minutes, 14½ seconds; in the second leg, 1 hour, 47 minutes, 9 seconds; total time elapsed, 3 hours, 39 minutes, 24½ seconds.

No fairer day for the test could have been desired. There was a brisk northwest wind which raised a little fuss on the water's surface, but not enough to have any material effect on the ship's speed. True it was enough to keep a shower of spray flying almost constantly over her forward deck during the eastward run, making a beautiful sight for those fortunate enough to be within seeing distance, but as resistance against the Missouri's progress it was of no practical account. The tide ran strongly against the ship on the first half, but allowances are made for tide. The guests were all on hand at Lewis wharf at 7 o'clock in the morning, and in the tugs Confidence of the Boston Tow Boat Co. and Iwana of the navy yard were taken down to the battleship in President Roads. No spick and span decks met their view as they walked across the plank from the narrow tugs to the broad decks of the battleship; cinders were all around, ropes were smutty, there was an air of business apparent wherever the eyes rested. Capt. Frank M. Howes of the Merchants and Miners Transportation Co. was on the bridge, in command, and Quartermaster Martin Bendixon, formerly in the transatlantic steamship service, but now stationed in the Newport News Ship Building & Dry Dock Co.'s yard, was at the helm. To the hardy quartermaster with bared hands and no topcoat, is due in great measure the Missouri's record, for not for one instant during the whole run would he relinquish the wheel, and he steered her in such a straight course that even old-time commanders on board expressed their admiration of his skill.

Starting out at a fair rate, the Missouri gathered speed as she neared the Chicago off Cape Ann, but when everybody on board was waiting, watch in hand, for her to cross the line, her speed slackened, and in answer to her helm she swung off to starboard, describing in an exceedingly short space of time almost a complete circle. A second time she started for the line and again swung around, but the third time there was no deviation, and she began her record-breaking trip, the results of which are told above. The circling and helm tests after the run proved eminently satisfactory to the government board of inspection and survey, composed of Capt. C. J. Train, president; Naval Constructor J. J. Woodward, Capt. L. C. Logan, Lieut. Com'dr Alfred B. Canaga, chief engineer, and Com'dr Walter C. Cowles.

Application was made this week by the United States Steel Corporation to place in the regular department of the New York stock exchange \$133,000,000 of new 5 per cent. sinking fund bonds of 1963. They are now being traded in in the unlisted department. These bonds are part of those issued to replace stock by virtue of the bond conversion plan.

DELAWARE RIVER SHIP BUILDING MATTERS.

Philadelphia, Oct. 28.—Preparations have been completed for the launch next Saturday of the steamship *Manchuria*, constructed by the New York Shipbuilding Co., Camden, for the Pacific Mail Steamship Co. The *Manchuria* is sister ship to the *Mongolia*, which was successfully launched July 25. With the exception of the *Minnesota*, launched at New London, Conn., several months ago, the *Mongolia* and *Manchuria* are the largest vessels ever built in this country. The keels of both vessels were laid at the same time, but more urgent work intervening, the launch of the *Manchuria* was postponed. Meanwhile much of her machinery and equipment have been put aboard and she will go off the ways much farther advanced in many respects than steamships usually are at their launchings. While not decided, it is most likely that Miss Harriman, daughter of E. H. Harriman, president of the Pacific Mail Steamship Co. will act as sponsor. President Harriman and other guests, it is expected, will attend the launch. These vessels have already been described at length in the Review.

Dr. Wm. C. Bearch, supervising engineer for the Pacific Mail Steamship Co. of San Francisco, visited the New York Ship Building Co.'s works last week and examined the *Mongolia* and *Manchuria*, expressing full satisfaction with them. The *Mongolia* will probably leave the yards on or about January and the *Manchuria* soon after.

The second-class cruiser *Denver* reached Neafie & Levy's ship yards Sunday on her return from her unsuccessful trial trip. Manager Sommers M. Smith of the ship building firm said anent the speed trial: "We are satisfied with the showing of the *Denver*. On the outward leg, although we stemmed a strong tide, the *Denver* made over the required 17 knots, but on the return leg the gale was so fierce and the vessel rolled and tossed so much that we only averaged 16.4 knots. The wind blew so hard the government officials were driven by the spray off the bridge. In all respects the *Denver* made a splendid showing and we are proud of her. The vessel will have another speed trial as soon as the government sets the date."

"Philadelphia has been hard hit by the stock market," said an official of one of the large ship building companies. "The Asphalt and Lake Superior companies caused heavy losses to our local interests and no doubt in indirect ways the ship builders will feel some of the effects. But I do not by any means take a pessimistical view of conditions. Many of the yards are busy on government work and will be for some time to come and that will keep things moving. Odd to say, while several of the steel companies are shutting down some of the yards are being quite seriously delayed in work by having to wait for steel. I understand orders for three large vessels have been held back on account of the monetary flurry, but I feel sure things will go along all right after the first of the year. It is my opinion that the ship builders would be better off if the so-called consolidators would leave them alone."

David C. Reed, president of the Harlan & Hollingsworth Co., Wilmington, who was appointed manager of the Crescent Ship Yards at Elizabethport, has gone to that point, accompanied by his confidential clerk. It is probable that a number of skilled employers from the Wilmington yards will go to the Crescent works. Operations at Elizabethport were resumed Monday—despite the labor trouble—on the two unfinished Mexican gunboats. Mr. Reed will continue as president of the Wilmington company.

Capt. Sanford, United States engineer, has advertised for bids for fitting out the Hell Gate dredging plant, which is to be brought to this point from New York to be used in dredging the Delaware and removing Schooner ledge. The big drill scow *General Newton* reached this port Saturday and the remaining vessels of the plant are en route by way of the Delaware and Raritan canal.

Capt. Charles Barr, of Reliance fame, christened the \$130,000 sea-going suction dredge at Cape May last Saturday. The captain was one of 400 guests who went to Cape May to attend the commencement of work by the improvement company that is to build a harbor at that point. The harbor will comprise an area of 500 acres. The entrance at Sewell's point will be 700 ft. wide and will be protected by jetties projecting 5,000 ft. into the ocean. About 2,500 acres of meadow or marsh land will be reclaimed and the harbor is to be 25 ft. deep. Capt. Barr was elected an honorary member of the Cape May Yacht Club. It is understood the New York Yacht Club will make the new Cape May harbor its southern port.

Scaled orders came to League island Saturday and that afternoon the cruiser *Dixie* was hurried to sea, her destination being, it is thought, Guantanamo, Cuba. The *Dixie* left short-handed, there being but three captains to command the four companies of marines, numbering 400. Com'dr W. B. Wadhams failed to relieve Capt. P. H. Delano of the command of the vessel and will reach the *Dixie* later. The marines carried supplies for an extended land campaign and large stores of ammunition.

Rear Admiral H. C. Taylor, chief of the navy bureau of navigation, who has personally inspected the League Island yards, said: "A 35 ft. channel for the Delaware is one of the things made necessary by our greater navy. I consider the early construction of the 35-ft. channel most important from a commercial as well as from a naval point of view. In League island, with its vast area and immense water front, the government has

a property that cannot be duplicated in the country." After enumerating many advantages of the yards he calls attention to the danger of having naval vessels bottled up by insufficient waterway in case of war and adds that it is unwise to spend millions on the yards if naval vessels are to run the danger of being wrecked or damaged to reach them. Rear Admiral Taylor's voice is another added to the long list of those who wish to see the navy built up and marine construction encouraged. The annual report of Admiral Bowles, chief of the Bureau of Construction, in which he recommends many improvements at the League Island yards is viewed with favor locally. The same can be said of the annual report of Genl. G. L. Gillespie, chief of engineers, who recommends that \$2,000,000 be expended on Delaware river improvements.

To the surprise of many members of the Maritime Exchange, Lincoln K. Passmore was elected a member of the board of directors at last Monday's meeting of the board. Mr. Passmore succeeds George E. Earnshaw, a former president of the board. He is vice-president of the Penn Mutual Life Insurance Co. and has been identified for several years with shipping interests. Some years ago he was the senior member of the firm of Passmore & Co., wholesale grain dealers.

The Red Star Line steamship *Pennland* has been sold by the International Navigation Co. to a Belgian shipping firm and will hereafter ply in the freight trade between Antwerp and South Africa. The *Pennland* has been in continuous service between this port and Antwerp for twenty-five years. The *Belgenland*, which has been sailing between Philadelphia and Liverpool, will succeed the *Pennland*, and the *Merion*, a sister ship to the *Haverford*, will succeed the *Belgenland*.

Work at the new dry dock at League island has been temporarily suspended because of the inability of the contractors to get piles. About seven-eighths of the bottom of the dock has been piled, but there are still 2,000 more logs to be driven before the concrete work can be completed. If piling can be got work will go on until some time in December.

Pennsylvania firms and manufacturers connected with or allied to marine industries who will make exhibits at the St. Louis exposition, as officially reported to the state exposition commission, are: Otto Gas Engine Works, Harrison Safety Boiler Works, Heine Safety Boiler Works, Nile Electric Traveling Crane Co., American Pulley Co., Thomas Devlin Manfg. Co., Bethlehem Steel Co., H. P. Feister, Pan-Coast Ventilator Co., Carbon Steel Co. and General Electric Co.

The American Steel Casting Co., Chester, has erected a new 40-ton traveling crane at its plant. The Alfred Box Co. of Philadelphia will build the large cranes for the new plant. The contractors are hurrying the work of erecting the buildings. The main building is now fairly well along.

COAL PRODUCTION—IMPORTS AND EXPORTS.

Nearly all of the increase in the importations of coal in the present year under the removal of rebate of duty authorized in January last has been from the United Kingdom. For the first nine months of the present year the imports amounted to 2,687,081 tons, against 1,546,112 tons in the corresponding months of 1902, an increase of 1,140,969 tons. In the 1902 period the imports were, of course, dutiable. These figures, prepared by the statistics bureau of the department of commerce and labor, include both bituminous and anthracite coal, but the imports of anthracite are unimportant, amounting to only 137,248 tons for the nine months of 1903.

In the same period the exportation of coal has increased more than the importation. The total coal exported from the United States in the nine months ending with September, 1903, amounted to 6,314,189 tons against 4,720,330 tons in the corresponding months of last year, an increase of 1,593,859 tons.

The foreign commerce of the United States in coal, whether of imports or exports, is extremely small compared with the domestic production, in which the United States now exceeds any other country of the world. Importations of coal have never reached as much as 2,000,000 tons in a single year prior to the fiscal year 1903, when they were 3,610,225 tons, or a little more than 1 per cent. of the domestic production, while the highest figure ever reached in exports was in 1901, when it amounted to 7,675,549 tons. The relative importance of the imports or exports to the coal production from the mines of the United States is shown by the figures of coal production as reported from year to year by the geological survey, which shows that the total coal production in the last year was 269,000,000 long tons, the quantity being about the same as 1901, in which year the figures were quoted as 261,873,675 tons. The growth in coal production in the United States is shown by the following table, which shows the number of tons of coal produced in the United States at decennial years from 1850 to 1900, and in 1901 and 1902:

Coal Produced in the United States at Decennial Years from 1850 to 1900 and in 1901 and 1902.			
Calendar year.	Tons.	Calendar year.	Tons.
1850	3,358,899	1890	140,866,931
1860	8,513,123	1900	240,788,238
1870	32,803,000	1901	261,873,675
1880	63,822,830	1902	269,171,023

A contract for building a dredge for Key West harbor has just been given to George A. Gilchrist of Belfast, Me., upon his bid of \$125,000. The dredge is to have a wooden hull.

OCEAN YACHT RACES.

With the offer of Sir Thomas Lipton to give a valuable trophy for an annual race across the Atlantic from Sandy Hook to the Needles interest in ocean racing has been greatly revived. Yachtsmen are all talking of a race across the ocean to be sailed next May, and as there are several fine schooners in American waters that could enter such a race it is not at all unlikely that quite a fair-sized fleet will start. The cup is in the hands of the Atlantic Yacht Club. Commodore Robert E. Tod of the Atlantic Yacht Club has worked hard to boom ocean racing; and in the last few years, while he has been flag officer of the Atlantic Yacht Club, several races have been sailed over courses that took the yachts far out of sight of land. The last and the longest of these races was from Sandy Hook to Nantucket shoals lightship, thence to Cape May and thence back to Sandy Hook. The distance was 525 miles, and it was a fine contest from the start. At a club dinner given in the Atlantic's house at Sea Gate recently Commodore Tod expressed the wish that a race across the Atlantic might be arranged for next season and shortly after this, just before he sailed for home, Sir Thomas announced that he would give a cup for such a contest. Commodore Tod at once said that he would give a prize worth \$1,000 to the second boat and smaller prizes for others according to the number of starters.

Ocean racing has received quite a boom in the last few years. The race on the other side from Dover to Heligoland for a prize offered by the emperor of Germany has attracted some of the best of the British and German yachts. The yachts after reaching the finish are then ready to take part in the German regattas and some of these races are over very long courses. Then when these regattas are over the yachts race back to Dover for another prize.

Only last week the king of England offered a cup for a race from Gibraltar. This race will be sailed next March and the finish will be at Nice, the yachts arriving there in time for the spring racing that is always held on the Riviera. The idea in holding the transatlantic race in May was to get the American yachts on the other side in time to take part in the Heligoland race and other regattas that are sailed during the summer in British and German waters.

Vice-Commodore Morton F. Plant of the Larchmont Yacht Club has already said that he would enter his new schooner *Ingomar* in the ocean race. This yacht is a Herreshoff-built boat and was very successful this season. She should be able to pick up some good trophies racing against boats in her class on the other side. George Lauder, Jr., has said that he will enter the *Endymion*. This yacht holds the record for a sailing yacht across the Atlantic. In 1900 she sailed from Sandy Hook to the Lizard in 13 days 20 hours. Her best day's run was 304 knots and her lowest day's record 250 knots. She averaged 10 knots an hour during the trip, and this is faster than many of the freight steamers make in crossing. Among others that are likely to take part in the contest and which are well able to make a race across the ocean are Francis Skinner's *Constellation*, Edward R. Coleman's *Hildegard*, J. G. Naeff Whitaker's *Iroquois*, Gibson Fahnestock's *Shenandoah*, Commodore Robert E. Tod's *Thistle*, Butler Ames's *America*, the winner of the famous cup; the *Corona*, *Coronet* and *Fortuna*. Mr. Ames has said that he is ready to race his yacht, and should the old *America* cross the ocean again she would attract considerable attention.

There are many schooners fitted with auxiliary motors and it might be arranged that these take part in the race, of course not using their engines. In this class are the new *Intrepid*, built for Lloyd Phœnix; the *Ariadne*, owned by Henry W. Putnam, Jr.; the *Vergemere*, recently built for A. C. Bostwick; the *Atlantic*, owned by Wilson Marshall, and the *Resolution*, owned by J. M. Masury. These boats would make as fine a race as ever was witnessed.

There have been three big ocean races that have furnished topics for discussion in yachting circles. One of these was an international event. The other two were between American boats. The first of these was between the *Henrietta*, *Fleetwing* and *Vesta*. It was sailed in 1866, the course being from Sandy Hook to the Needles. Pierre Lorillard owned the *Vesta*, George and Franklin Osgood owned the *Fleetwing*, and Commodore James Gordon Bennett owned the *Henrietta*. The stakes were \$30,000 a corner, making \$90,000 in all. The yachts started from Sandy Hook lightship on Dec. 11. The *Henrietta* was built by Henry Steers at Greenpoint. She was 205.4 tons, 107 ft. over all, 22 ft. beam and 11 ft. draught. Capt. Samueles had charge of the boat. The *Fleetwing* was built by Van Dusen and was 206.1 tons, 106.6 ft. over all, 23.8 ft. beam and 11.8 ft. draught. The *Vesta* was built by Carll at City Island. She was a centre-board craft, 110 ft. over all, 14 ft. 6 in. beam and 7.6 ft. draught, or with her centreboard down 15 ft. draught. The yachts experienced high westerly winds all the way across. The *Henrietta* won the race. She sailed 3,057 miles in 13 days 21 hours, 55 minutes, averaging 9½ knots. The *Vesta* sailed 3,046 miles in 14 days, 6 hours, 10 minutes and the *Fleetwing* sailed 3,005 miles in 14 days, 6 hours, 50 minutes. This was wonderfully fast time and in spite of the fact that the yachts sailed different courses they were very close together at the finish, the *Henrietta* beating the *Fleetwing* by 8 hours, 22 minutes, and the *Vesta* by 8 hours, 55 minutes. The *Fleetwing* sailed the better course, and she should have won the race, but on Dec. 19 she was swept by

a sea and six of her sailors were washed out of the cockpit and drowned.

The next race was between the *Cambria*, owned by James Asbury of London, and the *Dauntless*, owned by Commodore James Gordon Bennett. This race was sailed in 1870 and was for a cup worth \$1,250. It had been arranged that the *Cambria* should race across against an American yacht and when on this side she should compete for the America's cup. This race was started on July 4 from Daunt's Rock, and the finish was at the Sandy Hook lightship. The *Dauntless* led in this race to the Georges Banks, where she had the *Cambria* several miles to leeward of her. Then a shift in the wind helped the British yacht, and she won by 1 hour, 43 minutes. The *Cambria* sailed a northern course, while the *Dauntless* took a middle course. The *Cambria* sailed 2,917 miles in 23 days, 5 hours, 17 minutes, and the *Dauntless* sailed 2,963 miles in 23 days, 7 hours.

The last race sailed across the ocean was in 1887, when the *Coronet* defeated the *Dauntless*. The race was started off Bay Ridge on March 13, and the two yachts raced to Queenstown. The stakes were \$10,000 a side. It was a hard contest, and those on board the yachts had anything but a pleasant time. The *Coronet* won the race. She sailed 2,949 miles, and made the voyage in 14 days, 23 hours, 30 minutes. The *Dauntless* sailed 2,947 miles, and made her voyage in 16 days, 1 hour, 43 minutes. On the way over the yachts experienced strong winds, and for three days before reaching Queenstown every one on the *Dauntless* was soaked through. It was impossible to have proper meals, and only cold food, that could be picked up easily, was eaten. When Queenstown was reached no one on board cared whether the yacht had won or lost. They went ashore to the hotel, got a square meal and turned in. The next day, feeling rested, inquiries were made about the *Dauntless*, and it was learned that the *Coronet* had won. The *Dauntless*, too, had a hard time. The seas got into her fresh water tanks, and spoiled the drinking water. This information was told to Commodore Colt, who owned the yacht, and he promptly ordered wine for the crew. This nearly caused a mutiny. The men declared that they would not drink the sour stuff, but when the situation was explained to them the trouble was smoothed over.

If a good fleet of yachts start in the race next spring quite a boom will be given to English yachting. There is no doubt that special prizes will be offered by the British clubs to induce the American yachtsmen to enter their boats. It is more than likely, too, that a measure will be obtained on the comparative sailing qualities of the British and the American schooner. The *Ingomar* is probably the best of the American boats that will race. She is good on all points of sailing, and it will be very interesting to see what she will do with the crack British schooner, the *Cicely*.

MIDVALE COMPANY GETS PART OF CONTRACT.

Secretary Moody announced a day or two ago that he had decided to divide the contract for furnishing armor plate among the three bidders, namely, the Carnegie, the Bethlehem and the Midvale steel companies, all of Pennsylvania. The bids of the Carnegie and Bethlehem companies were identical. The Midvale company offered to furnish all the armor, some 16,000 tons, at figures which are about \$700,000 below those of the other two companies. It was stipulated, however, by the Midvale company that delivery of the plate could not begin for a period of twenty months after signing the contract, while the Carnegie and Bethlehem companies agreed to begin delivery within nine months. The Midvale company has not at this time a plant for the manufacture of armor plate but guaranteed to erect the required plant and have it in active operation within the period named. The navy authorities hesitated, because there was doubt as to whether the Midvale company could make good its offer. To determine this point Admiral O'Neil was sent last week by Secretary Moody to inspect the Midvale works and reported that in his judgment the plant could be erected and armor furnished that would be satisfactory, but he was in doubt whether the entire quantity of armor needed could be furnished in time for the vessels that are building. The contention was settled by dividing the contract, 6,000 tons going to the Midvale company to supply the two 13,000-ton battleships *Idaho* and *Mississippi*, and 5,000 tons each to the Carnegie and Bethlehem companies for the 16,000-ton battleships *Kansas*, *Minnesota* and *Vermont*.

Admiral O'Neil said that after inspecting the Midvale works he is convinced the company can furnish the quantity of armor required for the battleships *Idaho* and *Mississippi*. The company has now a large plant supplied with tools and machinery that can be utilized to some extent in the production of armor plate. As the company will give the usual guarantee to furnish plate that will stand the government tests and meet all requirements as to delivery it was thought good policy to encourage the erection of another large plant that can in the future be used by the government in building its war vessels. It is reported that the Midvale company will immediately spend \$2,000,000 on a new plant and that a new process for making armor plate, in which a large saving is effected, will be introduced.

Naval Constructor H. G. Smith, now on duty in the bureau of construction and repair, will shortly resign in order to accept a position with the Fore River Ship & Engine Co. of which Rear Admiral Bowles is to become president. Mr. Smith has been an invaluable assistant in the chief constructor's office.

LOOKING TO AMERICA FOR MATERIAL.

**British Ship Builders are Expecting Cheap Shapes and Plates from the Steel Corporation on Account of Falling off in Demand Here—
Ship Building Letter from the Clyde.**

Glasgow, Oct. 19.—It is noteworthy that the Clyde is still better off for orders than the other ship building centers, and I am glad (for the ship builders' not the ship owners' sake) to say that a sufficient number of new orders have been booked to arrest the depression that was feared during the winter, though not by any means to make up to the record of last year. The remarkable feature in the situation, which should be of peculiar interest to American readers, is the extent to which our markets for ship building material are looking to America. I suppose that every ship builder in his heart of hearts is asking when the Steel Corporation propose to "dump" steel plates at his doors at such a price as will enable him to screw down the local maker. This is a selfish world, as I presume the readers of this journal are not unaware, and I have not found that either ship builders or ship owners are in short supply of the human characteristic. At the present moment, ship builders want cheaper material, whatever may be their sentiments with regard to Mr. Chamberlain's plan of campaign. And cheaper material ought to be coming within sight, if iron smelters would be guided by the warrant market. But they won't. Warrants have fallen with every other vehicle of speculation, but pig iron manufacturers say they don't mind—they have as many orders as they can manage for some time to come and do not propose to reduce their prices at present. A steel works cannot be run on warrant iron, so though warrants go on shedding pence like peas, ship plates are no cheaper. If we inquire into the cause of this, we find that although the exports of pig iron have fallen off as compared with last year when America was taking so much, they are still for the nine months about 100,000 tons ahead of last year. For instance, in September the total was 78,250 tons as compared with 126,405 tons in September, 1902; but in the nine months ending September the total was 848,851 tons as compared with 739,276 tons in the corresponding portion of last year. Germany and other countries are now picking up in their requirements as America is falling off. Then the home consumption remains pretty steady, though the production in England (but not in Scotland) has declined somewhat and we are not now receiving iron from Canada and Russia as we did last year. Thus, smelters are parting easily with all they produce and do not reduce their prices, and without cheaper pig iron steel makers cannot give cheaper ship building material.

PROPOSAL TO LAY UP SAILING SHIPS.

A proposal has been made by Liverpool owners of sailing ships that all the owners of sailing ships in the United Kingdom should combine to lay up a proportion of their vessels as charters run off, at home or abroad, for a period of three, four or six months, to relieve the pressure on the freight market and give freights a chance of recovery. We still own some 2,000,000 tons of sailing vessels, which in many trades are, and probably always will be, preferable to steamers. There are many and frequent cases in which it suits a merchant better to put cargo on the high seas in a sailing ship to call at some outpost "for orders" while he selects his market, than to ship by steamer which may arrive on an unfavorable market and compel either a loss in sale or the expense of warehousing. But sailing-ship freights have been run down so deplorably of late that the general run of sailers are being operated at a loss, as doubtless American owners also find. The proposal to lay up all unchartered vessels instead of forcing them onto the freight market is an excellent one, but the difficulty is that owners of these vessels are not sufficiently well organized to carry out such a scheme thoroughly and systematically.

TWO LARGE AND FAST CRUISERS.

The launch of two warships from two private ship yards on successive days within the same week is an event even for the Clyde. The vessels are cruisers of the "County" class, and one, the Carnarvon, was launched by William Beardmore & Co.; the other, the Antrim, by John Brown & Co. The following figures are descriptive of both vessels: Length between perpendiculars, 450 ft.; breadth molded, 68 ft. 6 in.; depth, molded to upper deck, 38 ft. 6 in.; load draught, mean, 24 ft. 9 in.; displacement at load draught, 10,700 tons; horse power, 21,000 I. H. P.; speed, 22¼ knots. The general construction of the ships is similar to that of the Berwick, recently built by Beardmore & Co. The armament will consist of two 7.5-in. breech-loading quick-firing guns of latest pattern, mounted in barbettes, one on fore-castle and one on poop deck aft; ten 6-in. breech-loading quick-firing guns in casemates on the broadsides (four of these can be trained right astern and four right ahead); ten 12-pounder quick-firing guns; three 3-pounder quick-firing guns; eight 303 Maxim quick-firing guns; two submerged broadside torpedo tubes.

The propelling machinery consists of two sets of triple-expansion engines in separate watertight compartments, each set having four cylinders, the diameters being about 41½, 65½, 75½ and 73½ in. and the stroke 3 ft. 6 in. Three sets of Niclausse water-tube boilers in three separate watertight compartments will be supplied, and also a fourth set of single-ended cylindrical boilers in the after boiler room. The working pressure will be about 210 lbs. Contracts for these two vessels were placed in April, 1902, so no time has been lost by the builders over the hulls. Other two of the same class are also being built on the Clyde.

CAREER OF FRANCIS H. CLERGUE.

The following extremely interesting bit of special correspondence from Bangor, Me., was published last week in the Pittsburg Despatch. It purports to trace the career of Francis H. Clergue from the humble beginnings as a promoter to his present eminence:

An interesting career is that of Francis H. Clergue, who rose from the humble position of an errand boy in his father's little barber shop on Exchange street in Bangor, Me., to that of manager of one of the greatest industrial enterprises in America—the Lake Superior Power Co. and allied companies of the Sault, whose capital aggregated the sum of \$117,000,000, of which he talked as easily as if it were a toy. Mr. Clergue may be considered as one of if not the greatest of American promoters. His ability to interest capital at home and abroad and in great amounts has been something marvelous, and as a distributor of cash his equal is not easily found. Mr. Clergue was born and educated in the city of Bangor. It was here that he began his business life. In school he was a great student and an apt scholar, always of pleasing address and most genial disposition and generally liked. Among the first of his ventures was that of harvesting ice on the Penobscot, and through his efforts several houses for storing ice were built along the river near Orrington and a company organized which for a time did quite a business. From this he realized some profit, and after selling out his interests he speculated more or less in Maine timber lands in large tracts. From his dealings he gained considerable information concerning corporations, and a little later associated himself with the late Hon. Frederick M. Laughton of Bangor, with whom he read law, the firm name being Laughton & Clergue. They became quite largely interested in the copper mines of Bluehill, Me., and vicinity, formed several mining companies, and were quite prominent in this wild speculation by which so many people became losers.

Mr. Clergue conceived the idea of developing the resources of the country of Persia along gigantic lines, and most extensive plans on paper were made for the organization of the Persian Co., with the purpose of mining, building railways, water works, oil wells, and other equally great enterprises, and was able to raise large sums of money from the capitalists of Maine and New Hampshire as a fund to defray necessary expenses of travel and investigation in this distant country, and in due course he started and was able to reach the highest of authorities, nothing short of the Shah himself, and his great power of persistence and suave manners gained for him all he desired in this line. He was for nearly six months at Teheran, when he returned to Bangor, but the glittering prospects soon paled into insignificance and the great company was soon forgotten.

Then Mr. Clergue, with associates, organized the Brewer Water Co., to supply the citizens of Brewer, just across the river from Bangor, having a population of about 4,000, and made arrangements to derive the supply from the mains of the city of Bangor, upon a basis which seemed to be reasonable, in this way saving the cost of building and operating a pump house and machinery, so the cost could but be small. A bond issue of \$75,000 was floated among the banks and private interests of Maine and for a time all went well. Later the Bangor Street Railway Co. was organized by Mr. Clergue, and this company issued \$20,000 of bonds, which were floated among the same class of interests; a building was secured, centrally located, dynamos placed, and in reasonable time Bangor was able to boast of having one of the earliest electric street railways. Its equipment, however, was of rather inferior quality. Mr. Clergue conceived the idea of developing power near the village of Veazie, 3 miles up the river from Bangor, so he secured the old Veazie mills and at once began the construction of a very extensive power house of brick and stone, having organized another company called the Penobscot Water & Power Co., and floated an issue of \$200,000 bonds for the purpose. Most expensive work was done and a large amount of power was generated by this plant and offered for sale. The Brewer Water Co. discontinued its connection with Bangor, the street railway discontinued its power house in Bangor, and was to be operated from and by the great power plant at Veazie. The next organization was the Bangor Electric Light Co., with Mr. Clergue as promoter. Bonds were issued and floated, poles erected, and light sold to the city of Bangor, power being furnished at Veazie, and this for a time went well.

Mr. Clergue organized still more companies to supply water to the adjacent towns of Orono, Stillwater, Oldtown, Milford, and Bradley, all paying tribute to the Penobscot Water & Power Co., and as a little side issue Mr. Clergue erected pulp machinery in a small room and for a short time manufactured pulp, which he freighted to Bangor, thence by steamer to Europe, but being unable to furnish a cargo was obliged to buy elsewhere in order to complete shipment. His next scheme was the construction of a railway up the side of Green mountain, near Maine's famous resort, Bar Harbor. Another issue of bonds was in order. It was made and floated. A railway was built and the excursion trip attractively shown up, being by tally-ho from the village, steamer across Eagle Lake, then the railway—a pretty trip, but in brief time this company collapsed. Next in order comes the purchase of land at the terminus of the Maine Central Railroad, at Mt. Desert Ferry, and the construction of a beautiful hotel for visitors; more money borrowed and in a short time this property was a failure.

Mr. Clergue then sought the south on a tour of investigation and saw great possibilities at the city of Mobile. He succeeded in securing a controlling interest in one of the largest and most influential banks there, became its president, then made a trip to England, where he interested capitalists sufficiently to have them send a representative over, and as a result of his investigations and recommendations Mr. Clergue organized a trust company with the magnificent name of the British-American Trust Co., with a large capital. In a comparatively short time both these institutions closed their doors.

Mr. Clergue, desiring to improve the conditions and reduce expenses of maintenance of the several companies in which he was interested in Bangor and to provide ways and means, organized another company under the name of the Public Works Co., with a capital stock of \$1,000,000 and a bond issue of \$1,000,000. The company purchased the stocks of the several subsidiary companies and offered to exchange its new bonds at face or par value for the bonds of the old companies. This scheme was not a success, although every possible effort was made and solicitors were sent out to interview banking people and individuals, but all proved of no avail. A default was made in payment of coupons of several bonds, while rumors of a receiver were freely heard, but this was avoided by the calling of a meeting of the majority of bondholders, who elected a committee of able financiers to investigate matters and make a report. This was done, and in due time the recommendation that all the properties be estimated at their real value and then exchanged proportionately was accepted, and the million-dollar issue of bonds was scaled down 40 per cent. Since then large additional amounts of cash have been expended on these properties, which have enabled the company to pay its maintenance and interest at 5 per cent. on its \$600,000 of bonds. Later still Mr. Clergue became very confident that he could be of great benefit to his native city in the establishment of large enterprises which he felt sure he could float, provided he could secure concessions from Bangor.

Failing in these he turned his attention to Canada and her resources, and through his efforts was organized the great industrial enterprises that are now so badly tangled and in which so much money has been sunk.

TARGET PRACTICE IN THE NAVY.

The naval estimates for this year contain an item of \$1,336,000 for target practice. It is estimated that when the ships now in course of construction are added to the fleet this sum will have to be more than doubled, that is, the annual cost for target practice in the navy will be \$2,690,000. The navy has grown enormously in the past few years. In 1897, just six years ago, the number of enlisted men was limited to 7,500; now the number is 28,000, to which must be added 6,750 marines, or a total of 34,750, nearly five times as many as before the outbreak of the Spanish-American war. The ships and guns have increased in practically the same ratio. The naval register of the present year gives the names of 312 vessels, large and small. This includes tugs and vessels under construction, however.

To fire a 13-in. gun, the largest type used on an American warship, costs for powder and shell just about \$500. Four times a year the men are exercised in big gun practice with regulation charges, each man of the gun's crew firing four shots at these trials. There are seven men in a gun's crew on these guns. Now if you multiply seven by four, that by four again, then multiply by the number of 13-in. guns in the navy, and take into consideration that every two shots costs \$1,000, it is not difficult to see how fast the big guns burn up the appropriation. But the number of largest guns is not a tithe of the 8 and 6-in. guns, in addition to the 5-in., the 4-in., the 6-pounders and 1-pounders, whose number is legion, and on which the practice is just as important and assiduous as on the big ones. Luckily the cost of these is less. To fire a 4-in. common shell costs \$17, a 6-pounder \$3.86, a 1-pounder \$1.14. Every ship has a battery of Colt automatic machine guns which fire cartridges in a stream fed from a belt at the rate of 400 a minute. Four times a year each man fires two belts on one of these guns. It takes a little over two minutes, and it costs about \$7 a belt.

Such is the regulation gun practice with actual ammunition which has been in vogue of late years, but recently another and important custom has been added. That is the record training for the title of gun captain, which carries with it a certain honor and \$2 a month more pay. Any man is eligible for this, be he landsman, seaman, gunner or cook, and all are expected to take part in the competition. The title carries with it no change of duties. The cook may be a gun captain and he must cook still, but the title and the \$2 extra are eagerly sought. Moreover, a good record of this sort puts a man in the way of possible promotion.

Even this amount of actual practice with full charges, however, is not enough to make the men what they are today, the best naval gunners in the world. Another and inexpensive method is used for daily work at the guns. It is a modification of what we used to call "sub-caliber" practice. This used to be done with a rifle barrel inserted in the bore of the big gun, aiming and firing the big gun at a properly reduced target near by, but using only the rifle charge. This method has been modified again by the late Lieut. Morris of the Charlestown navy yard with what is known as the "Morris tube." The rifle is a 22-Flobert, rigged just over the big gun. There is a frame at the muzzle and a

box arrangement to catch the bullet. The target is a very small one just beyond the muzzle, and is so arranged that an ingenious mechanism makes this target roll and pitch as a ship would in actual warfare. The men take their daily round of shots on mechanism, pointing and training the big gun as at a regular target. The expense is very slight and the results are excellent. A careful record of each man's shooting is kept, and when it reaches a certain degree of accuracy, he is in training for the real gun practice, which, if he is successful, will give him the much coveted title of gun captain and that extra \$2 a month.

One of our best and most modern battleships, the Alabama, has lately made a record in target practice that any ship in any navy might be proud of. The Alabama has an armament of four 13-in. guns in turrets, fourteen 6-in., sixteen 6-pounders, six 1-pounders and four machine guns. With a 13-in. gun two hits were made on a target in two minutes. Gunner Bright with No. 4 gun in the after turret made four hits in two minutes, eight seconds—this while the target was 1,600 yds. away and the ship was steaming at the rate of 8 knots an hour. Seamen Allen and Fletcher on No. 3 gun scored 1.14 hits per minute, the highest average to date for any gun. Of sixteen shots all hit the target but one, and that hit the floating frame on which the target rested. The target was a rectangle of canvas 21 ft. wide by 17 ft. high. This "miss" fired at a battleship would have struck the vessel just on the water line, a most vulnerable place. The percentage of hits with the big guns was 93.75.

The result of all this rapid accurate work in actual warfare would be something tremendous. It has been proved that the Alabama's 13-in. guns can be fired so that each gun makes 1.14 hits per minute. They throw 1,100-lb. projectiles and if the four guns were brought to bear on the same point 4,400 lbs. of steel projectiles loaded with high-power explosives could be hurled in one minute and a quarter. The shell for the 6-in. guns weighs 100 lbs. The Alabama carries fourteen 6-in., seven on a side. Of course only seven can be fired at the same object, but if the best average of the gunners was kept up 45.85 shots could be fired, with accurate aim, hurling 4,585 lbs. of shell through the air each minute. Eight of the sixteen 6-pounders can be trained on the same target, so with the record of 10.59 hits a minute with the eight guns 84.75 shots would be falling on the enemy's vessel a minute. Meantime the 1-pounders and machine guns would add their steel hail to the storm. That's the way the naval experts reckon it, and they claim that with such accurate shooting three minutes would be enough to put a quietus on any hostile vessel afloat.

When one takes into consideration the size and weight of a 13-in. gun it seems impossible that such records could be actually made, but the test has proved it. The 13-in. gun mounted on the American warships weighs 60½ tons. It is 40 ft. long and the length of the rifling, that is from the muzzle to the charge chamber, is 370.5 in. The powder charge of black powder is 550 lbs., of smokeless 280. The 1,100-lb. steel projectile leaves the muzzle with an initial velocity of 2,100 ft. a second and would penetrate 33.5 in. of wrought iron at the time it leaves the gun. With the muzzle elevated at the proper ballistic curve, a little less than an angle of 45°, this projectile would go 12 miles. It is not possible to get this elevation on a ship, however. The navy department realizes the importance of good shooting and takes care that Jack shall take more than an ordinary interest in his work at the gun. Besides the glory and the extra money there are other emoluments coming to the record men in gunnery. Shore liberty, which is the sailor's chief delight, is served out liberally to the best marksmen and often the officers of a ship chip in and give extra prizes. There is aboard the Alabama a silver cup, purchased by the officers, on which the names of the best gun crews are engraved each year. The man who gets his name on this cup is filled with worthy pride and it is rumored that on special occasion he may have this cup filled with the best and treat his friends from it.

DEATH OF ROBERT H. THURSTON.

Prof. Robert H. Thurston, director of the Sibley College of Engineering at Cornell university, who died very suddenly at his home on the campus on Saturday last, was one of the foremost engineers of the country. He was born at Providence, R. I., in 1839 and was graduated from Brown university. He served with distinction in the engineering corps of the United States navy during the civil war and at its close was assigned to the faculty of the Annapolis naval academy. In 1871 he became professor of engineering at Stevens Institute and in 1885 took the directorship of Sibley college at Cornell. His administration was very successful. His death was extremely sudden. He had just returned from a brisk walk and was sitting in his library awaiting the arrival of Hon. Andrew D. White, former president of the university, when he was stricken with heart disease. His wife thought that he had fallen asleep, but when she came to rouse him she perceived that he had passed away.

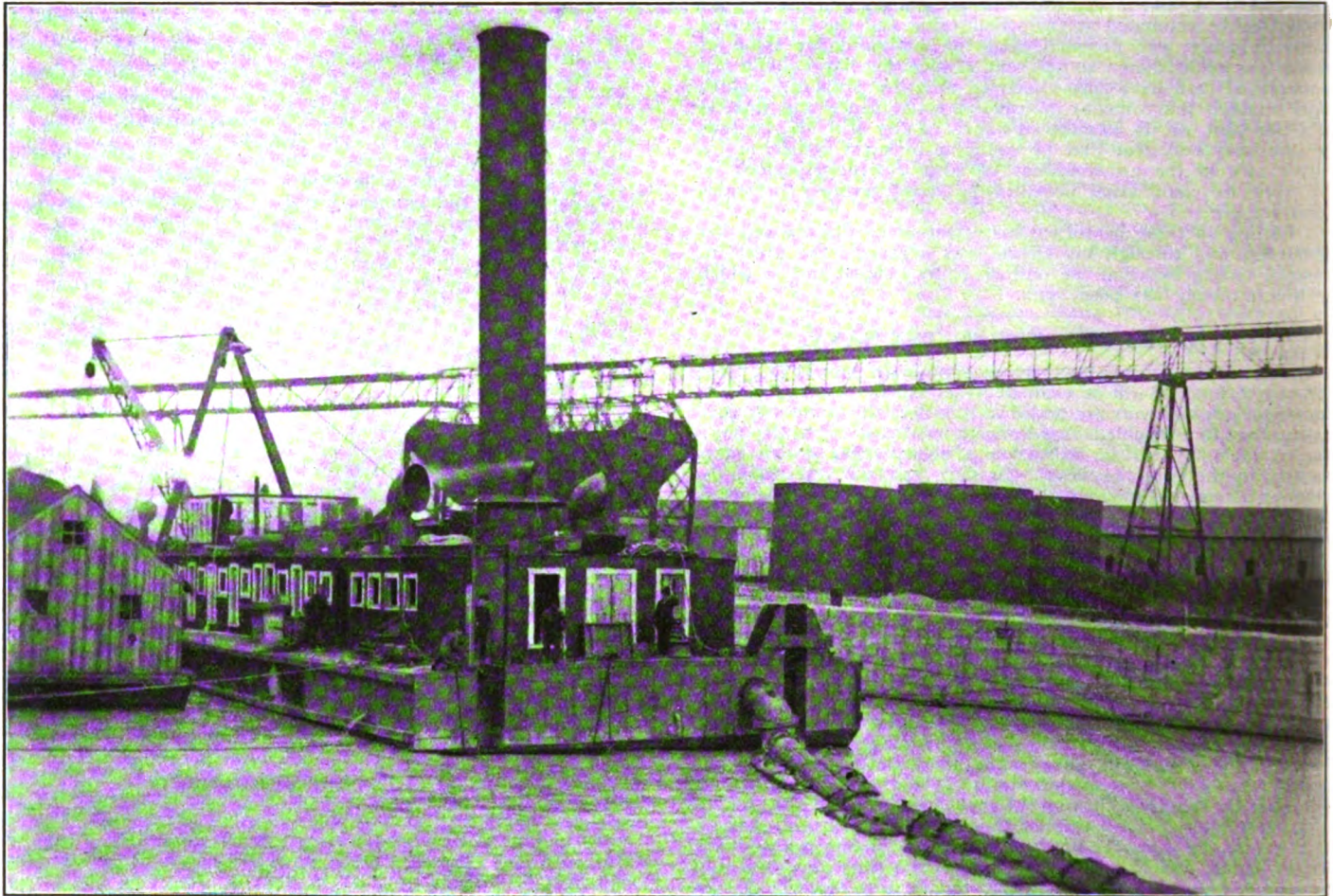
The Chase Machine Co. of Cleveland is advised that the patent infringement proceedings instituted two or three years ago by the owners of the Shaw & Spiegle steam towing machine patents, on account of a machine that is made by the Chase company, are at an end, as the supreme court of the United States has just denied an application for review of the decision of the circuit court of appeals declaring that the Chase machine did not infringe.

NEWS OF THE GREAT LAKES

SHIP-CANAL AT BIG BUFFALO STEEL WORKS.

A feature of the great plant of the Lackawanna Steel Co. at Buffalo will be its facilities for taking iron ore from vessels direct to furnaces. About \$800,000 altogether is involved in the building of the canal from the lake into the works of the steel company. This canal is 4,000 ft. long, 200 ft. wide and has a continuous depth of water of 23 ft. The superstructure rises 11 ft. above the surface of the water and is of concrete construction, the concrete extending 3 ft. below the water level and resting upon timber cribs. The L. P. & J. A. Smith Co. of Cleveland built the canal from the shore out, which is approximately half its

an extended horizontal reach, which is lacking in the Conneaut type, so as to get at the ore remote from the hatches. These machines will work in any vessel having hatches 7 ft. wide and 10 ft. long and the buckets have a reach of 16 ft. in any direction under the deck of the vessel. These machines have not, as yet, equaled the record of the Conneaut machines, but as the Conneaut machines in establishing a record operated under special conditions, it is not expected that the Conneaut record will be equaled at Lackawanna. The storage piles at the Lackawanna plant are well back from the canal, so that the weight of ore can have no influence upon the wharves. Everything at Lackawanna



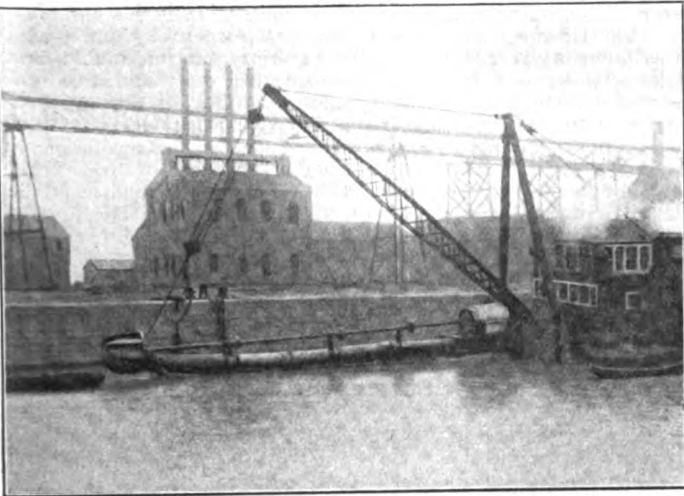
The Hydraulic Suction Dredge, owned by the L. P. & J. A. Smith Co., Cleveland, in the Ship-Canal at the Lackawanna Steel Co.'s Plant, Buffalo.

length, and the steel company built the rest itself. While the canal is not completely dredged out as yet, the greater portion of it is in active service, the steamer Moses R. Taylor being the first vessel to deliver a cargo of ore there. Probably no steel plant in the world has such an unbroken approach for the handling of its chief raw material. Ore can be delivered by the largest and modern of steamers directly to its stock piles without the least difficulty and without the necessity of breaking bulk or re-handling. The canal, nearly a mile in length, traverses the space directly alongside the blast furnaces, of which there are several batteries. Railway tracks run alongside the canal so that the vessels may discharge directly into cars, if need be. The Hulett automatic unloaders, of which there are three in commission and two under construction, are so equipped as to unload a vessel directly into cars, or by means of a conveyor into the furnace stock pile. In principle these machines are duplicates of machines at the Conneaut docks but are different in so far as that they are electrically operated. They also differ in that they are provided, as mentioned, with an extended cantilever bridge carried on the frame of the unloading machine, for the purpose of discharging into stock pile. When it is necessary to discharge into stock pile the ore is dropped into a bridge car near the front of the dock and is then drawn back along the cantilever bridge and unloaded into the storage pile. The bucket has

has been done upon a broad and magnificent scale. The whole storage yard, big as it is, is commanded by double cantilever conveyors of enormous reach that convey the ore with automatic buckets from the stock pile to the furnace bins, from whence it is taken to feed the furnaces, thus making an automatic proposition of unloading the vessels, storing the ore and of rehandling to the furnace stack. These conveyor bridges are about 500 ft. long and handle a load of about 10 tons at a time. These machines were designed by Mr. George Hulett and built by the Webster, Camp & Lane Co. of Akron.

At work upon the canal at present is a new dredge just completed for the L. P. & J. A. Smith Co. Three firms contributed to its construction. The Forest City Boiler Works of Cleveland built the hull, the Great Lakes Engineering Works of Detroit building the engines, pumps and cutter, and the Lake Erie Boiler Works of Buffalo supplying the boilers and furnaces. The dredge is 120 ft. long, 40 ft. beam and 12 ft. deep. She has triple-expansion engines with cylinders of 17, 27 and 45 in. diameter and stroke of 24 in., designed for 1,000 H. P. Steam is supplied by two Scotch boilers, 13 ft. in diameter and 12 ft. long, allowed a working pressure of 160 lbs. and equipped with three 40-in. Morison corrugated furnaces, connecting into a single smoke stack. The dredge is not self-propelling, the purpose of her engines being to operate a 24-in. centrifugal pump, discharging

through 4,000 ft. of pipe. The cutter in the bow of the vessel, 7 ft. in diameter, is electrically operated, power being supplied by a 250 H. P. Westinghouse motor, the current being generated by the main engines. The dredge is lighted throughout by electricity and is also equipped with a powerful searchlight. Ordinarily in dredges of this character the discharge pipe is floated by flat-bottom supports. In this case the discharge pipe is supported by steel pontoons in the shape of air-tight pipes on either side of the discharge pipe. The dredge cost \$110,000, and is about as complete a hydraulic suction dredge as is to be found in this country.



The Cutter of the Suction Dredge.

FREIGHT SITUATION—ORE MOVEMENT.

While ore shipments for October will not, of course, be known for several days yet it is not now expected that the total shipments for the season will exceed 24,000,000 tons. The score stood 19,376,000 tons on Oct. 1, but the movement has been so economical since that those best informed do not expect the shipments for the balance of the season to reach 5,000,000 tons. Even 24,000,000 tons, however, is a quantity not to be sneezed at. It is 3,500,000 tons more than was moved in 1901 when the iron boom of the country was at its flood. The total of 27,500,000 tons in 1902 was extraordinary and phenomenal, and moreover unwarranted. The furnaces of the country were not able to care for so spontaneous and so sudden an increase over the normal supply; and the natural consequence was that many of them entered the season of 1903 with very large stock piles. Even at the beginning of the year they were reluctant to order and ore sales were slow. It has been characteristic of the smaller class of furnaces that they have all ordered ore with extreme caution throughout the year, and even now many of them realize that they have all the ore they want to tide them over the winter. Certain deliveries, therefore, pledged for this fall will not now be delivered until next spring. So leisurely has been the movement of ore during the present month, and such the disposition of the mines themselves to curtail shipments, that contract vessels have easily cared for almost the entire movement. The stiffening of the Chicago corn rate was welcome news to the smaller class of carriers and probably kept some of them from going to the dock. Lumber cargoes are being offered freely at the advanced rate of \$2.75 and as this class of tonnage is scarce and the feeling quite firm \$3 is being talked of. Coal docks at upper lake ports are so crowded that there is some fear of vessels not getting all the coal that is due them on contracts.

FROM THE HEAD OF THE LAKES.

Duluth, Oct. 28.—Grain receipts at the head of Lake Superior last week were 3,560,000 bu.; Shipments, including mill withdrawals, 3,865,000 bu. Wheat is not coming in as fast as last year and is low in quality. Of the 1,400 cars of all grains on track Monday morning 600 were flax and there are 525,000 bu. more flax here than wheat. The week this year showed a loss in store of 235,000 bu., while the corresponding week last year showed an increase of 658,000 bu. Of the 1,994,000 bu. in store now 1,685,000 bu. is special bin stuff in mixing houses, wet wheat, or wheat held out of public stocks for other reasons. The barley movement to Duluth is about over for the season, with receipts of 4,150,000 bu., compared with 3,300,000 bu. to this time last year. Barley will come from now on in a comparatively small stream. The flax movement is at its zenith, it is supposed, and will be very large for a month or two yet. Railroads are bringing as much grain here as they are able to move with cars and motive power at their disposal and will continue up to their capacity for some time. The receipts of wheat are very disappointing, however, both in quantity and quality. Sales at Duluth last week of wheat for eastern fall shipment and for export were quite large, amounting to more than 1,250,000 bu. Duluth shippers, too, have been considerable sellers of Manitoba wheat for export to the United Kingdom.

At Duluth on Monday Germany was a buyer of wheat, and the outlook for shipments of both wheat and flour was good.

The United States Steel Corporation is beginning to put its ships in winter quarters here, starting with the barges. These will be shortly followed by the steamers. A large part of the fleet is to spend the winter at Superior and Duluth. This will keep the yard of the Superior Ship Building Co. fairly active with repair work and with refitting.

Reconstruction of the Peavey concrete wheat storehouse will be completed in a short time. It has been a heavy job, on account of the interbedded steel tie bars that run through the house, connecting the series of bins. Four hundred men are working on the concrete foundations for the tile wheat storage bins under construction by Barnett & Record for the Canadian Northern Railway at Port Arthur. The present work consists in duplicating the great structure erected last year and tested during the winter of 1902-'03. Each half has a storage capacity for 2,250,000 bu. wheat, making the whole about 500,000 bu. larger than the Peavey concrete storage at Duluth.

Curtailments in output and force employed are to take place at several more of the old range mines very soon. These include the discharge of about 200 unmarried men from each the Chapin and Aragon, the two leading properties of the United States Steel Corporation on the Menominee range. The two mines have been employing about 2,000 men between them. The various Corrigan mines of Crystal Falls and vicinity are to reduce at once. Great Western, Armenia and Lamont will close entirely and will be permitted to fill with water. Great Western's big pit is to be filled with waste, to prevent the washing of sand into the ore below. Crystal Falls and Tobin, of the same ownership, will be maintained active for the winter, it is now presumed, and these and Bristol are the only mines at Crystal Falls village that will do anything. At Tobin they are grading extensive stockpiling grounds and will mine heavily. This property is a new and important mine and is liable to be one of the best in the Crystal Falls section. Corrigan mines of the Gogebic range are also to be curtailed materially, but they are, in the aggregate, of comparative unimportance.

Iron ore shipments of the Duluth, Mesabi & Northern road have reached 5,200,000 tons for the season, about 300,000 tons above last year to this time. The Duluth & Iron Range has shipped less than last year to this time, as has also the Great Northern.

CHICAGO GRAIN REPORT.

Chicago, Oct. 27.—In the shipments since the last report there is quite a little reduction to be noted. This is in part due to a scarcity of vessel offerings. Within the past few days all room offered has found ready acceptance at the advanced basis of 1 3/4 cent wheat, 1 1/2 cent corn and 1 1/4 cent oats for Buffalo and Georgian bay. The Lake Ontario basis is nominally 3 1/2 cents corn.

The immediate shipping demand seems pretty well covered, but after the disposal of room that is under engagement a stronger tendency is looked for in freights. Already about half million of capacity is reported under engagement for early November loading at 1 3/4 cent corn to Lake Erie points. The necessity of holding rates to the advanced level or better is generally appreciated, since any decline under present up-freight conditions must compel a withdrawal of the going traders.

Of the shipments noted below for the week just closed, there was moved via all rail lines some 380,000 bu. wheat, 105,000 bu. corn and 967,000 bu. oats; to Buffalo and other American points via lake, 360,000 bu. wheat, 1,400,000 bu. corn and 278,000 bu. oats; and to Canada via lake, 3,500 bu. wheat and 330,000 bu. corn.

Following is a summary of the shipments, lake and rail:

	This week.	Last week.	last year
Wheat, bu.	781,272	856,720	370,400
Corn, bu.	1,833,244	3,201,887	1,445,343
Oats, bu.	1,244,944	1,467,660	1,156,744
Rye, bu.	244,656	8,041	23,970
Total, bu.	4,104,116	5,534,308	2,996,457
	Since Jan. 1, 1903.		Same time last year.
Wheat, bu.	18,156,305		26,420,695
Corn, bu.	76,915,235		36,821,519
Oats, bu.	53,806,955		45,531,988
Rye, bu.	3,293,460		2,103,204
Total, bu.	152,171,955		110,877,406

Stocks of grain in public and private elevators are thus reported:

	Week just closed	Last week.	Same week last year.
Wheat, bu.	5,582,000	5,589,000	9,787,000
Corn, bu.	4,655,000	4,707,000	1,559,000
Oats, bu.	2,580,000	2,489,000	4,021,000
Rye, bu.	387,000	600,000	318,000
Total, bu.	13,204,000	13,385,000	15,685,000

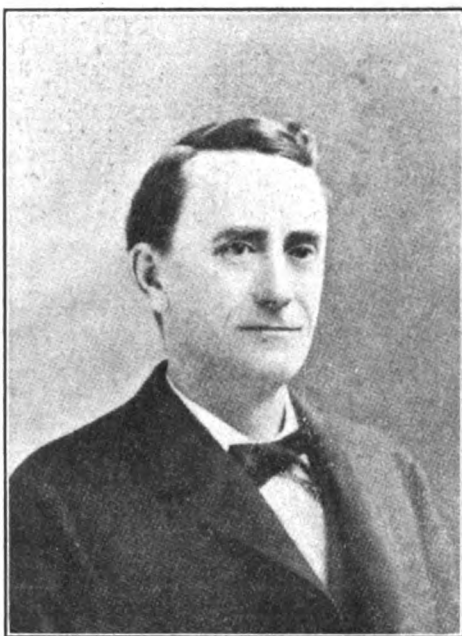
Fire destroyed the workshop at the lower dry dock in James-Davidson's ship yard at Bay City last week. The loss is not large.

MEMBERS OF LAKE LEVEL COMMISSION.

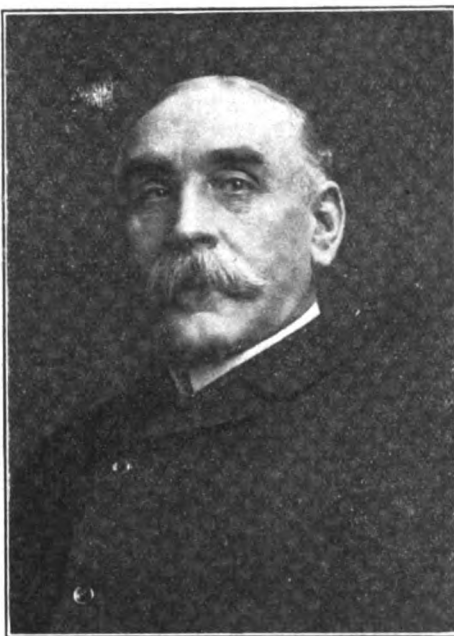
The American members of the international commission to investigate the level of the great lakes are all competent men whose previous training fits them for the task. The British commission has not yet been appointed, though undoubtedly equal care will be exercised in the selection of its personnel. The questions which this commission will have to decide are many and important. Records taken over a series of years show that the level of the lower lakes has been gradually falling. It will be the purpose of the commission to ascertain whether the deepening of the channels or the construction of artificial waterways has had any influence upon this decline. The commission will also consider, as a remedial agency, the construction of a dam at the outlet of Lake Erie. It is the general opinion of engineers that a dam at this point will sensibly affect the depth of water, increasing it throughout Lake Erie and in the Detroit and St. Clair rivers. Such an increase of depth would, of course, be of paramount advantage to navigation, in all the harbors of Lake Erie as well as in the Detroit and St. Clair rivers, but, of course, there is also the very important question of abutting property rights to be considered. The dammed waters are likely to encroach upon valuable shore lines. The authority for the appointment of the

from 12 to 26 ft. He was promoted through grades to lieutenant-colonel on March 31, 1895, and was made a brigadier-general during the war with Spain. He went to Porto Rico in 1898 and had immediate command of the troops in the affair at Coamo on Aug. 9, 1898. At present he is in charge of the harbors at Chicago and Calumet and of the Chicago and Calumet rivers. He is the author of a manual on military engineering.

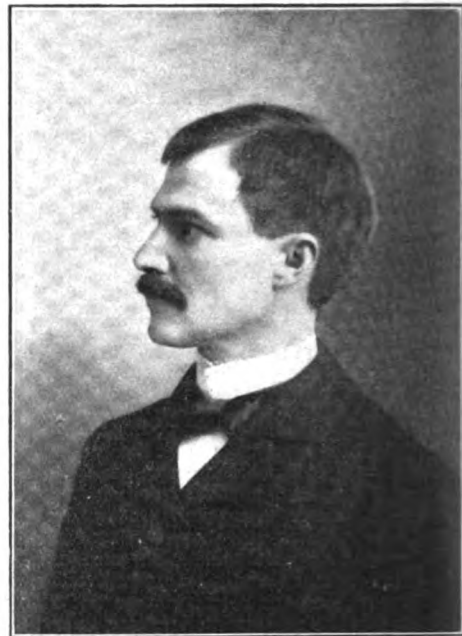
Mr. George Clinton is the son of George W. Clinton who was for many years judge of the Superior court of Buffalo, and who attained some eminence as a naturalist, especially in the department of botany. He is a grandson of DeWitt Clinton, governor of the state of New York, and a great grandson of Maj. Gen. James Clinton, a distinguished general in the revolutionary war. George Clinton, first governor of the state of New York, holding the position for many terms, and also vice president of the United States, was Gen. James Clinton's brother. The present George Clinton was born Sept. 7, 1846, at Buffalo. He was educated in the private schools and in the law department of Columbia college, New York. He was admitted to the bar in 1868 and has practiced law ever since. Of late years his practice has been largely in marine matters connected with the lakes, especially marine insurance, and this has given him special and intimate



Mr. George Clinton.



Col. O. H. Ernst.



Prof. Gardner S. Williams.

commission is contained in the following provision in the river and harbor bill of June 13, 1902:

"That the president of the United States is hereby requested to invite the government of Great Britain to join in the formation of an international commission to be composed of three members from the United States and three who shall represent the interest of the Dominion of Canada, whose duty it shall be to investigate and report upon the conditions and uses of the waters adjacent to the boundary lines between the United States and Canada, including all the waters of the lakes and rivers whose natural outlet is by the River St. Lawrence to the Atlantic ocean; also, upon the maintenance and regulation of suitable levels. . . . The said commissioners shall report upon the advisability of locating a dam at the outlet of Lake Erie, with a view to determining whether such dam will benefit navigation, and, if such structure is deemed advisable, shall make recommendations to their respective governments looking to an agreement or treaty which shall provide for the construction of the same, and they shall make an estimate of the probable cost thereof."

American members of the commission are Col. O. H. Ernst, government engineer at Chicago; Prof. G. S. Williams of Cornell university, and Mr. George Clinton of Buffalo, N. Y. It will be interesting, of course, to note the previous training of these men, and inquiry develops the fact that the selection of President Roosevelt has been very wise indeed. Col. O. H. Ernst was born at Cincinnati, June 27, 1842. He was educated at private schools until 1858 and attended Harvard university from 1858 to 1860. He graduated from West Point in 1864 as first lieutenant of the corps of engineers. He served as assistant chief engineer of the army of Tennessee to the close of the Atlanta campaign. He was assistant engineer on fortifications on the Pacific coast from 1864 to 1868 and went as astronomer with the United States commission to observe the solar eclipse in Spain in 1870. He was instructor in practical military engineering in West Point from 1871 to 1878 and was engineer in charge of western river improvements from 1878 to 1886. The most important work that he has done as a constructing engineer was the introduction and development of the permeable system on the Mississippi river between the Missouri and the Ohio rivers from 1878 to 1886, and the inauguration of the plans and methods of construction finally adopted at Galveston harbor whereby the channel was deepened

knowledge of the great lakes and the business connected with them. His public services have also fitted him for his present task. He has been president of the Chamber of Commerce of Buffalo and was chairman of the Trunk Sewer Commission of that city when it had in charge the building of two extensive and costly branches. He was chairman of the commission appointed by Gov. Black of New York state to investigate the expenditure of \$9,000,000 appropriated for the improvement of the Erie canal. Mr. Clinton has always been prominent in advocating the improvement of that waterway. During his service in the New York legislature of 1884 he was chairman of the canal committee of the assembly. He might be said to have an hereditary training for this office since his grandfather, De Witt Clinton, was the primal force in improving the waterways of the state of New York, and his own inclinations have been along the same lines.

Mr. Gardner S. Williams was born at Saginaw City, Mich., in 1866. He is a grandson of the founder and first mayor of that city. He attended the high school in that city, graduating in 1884 and entering the university of Michigan, where he took the course in civil engineering. He graduated from the university in 1889. During the summer of 1887 he was engaged as assistant engineer upon the waterworks construction at Bismarck, Dak. In 1888 he was the resident engineer in charge of the construction of the Greenville, Mich., waterworks, and in 1889 was chief engineer of the construction of waterworks at Owosso, Mich. From 1890 to 1893 he was draughtsman and superintendent of erection for the Russel Wheel & Foundry Co. of Detroit, at that time extensively engaged in the construction of lighthouses for the United States government, and in this capacity he had charge of the erection of numerous buildings, blast furnaces, lighthouses and beacons around the lakes. In 1893 he became civil engineer of the board of water commissioners of Detroit. In this connection he made surveys and measurements of discharge in portions of Detroit river and Lake St. Clair and general studies of the waters between Lakes Huron and Erie. He also made an experimental investigation of the flow of water in curved pipes for which, with two associates, he received the Norman medal from the American Society of Civil Engineers for 1902. In 1898 he became engineer in charge of the hydraulic laboratory and professor of experimental hydraulics in Cornell university, a position which he at present holds. He has conducted at Cornell experi-

ments upon the flow of water over dams for the United States board of engineers and deep waterways, the city of New York, Cambria Steel Co. and the United States geological survey; and upon the flow of water in canals for the New York state canal survey and the geological survey. He was also consulting engineer to the Lake Superior Power Co. in connection with turbine installation and the measurement of the discharge of St. Mary's river and has carried on considerable consulting practice outside of his regular duties. He is a member of the American Society of Civil Engineers, the New England Waterworks Association and the Michigan and Detroit engineering societies.

SHIP-CANAL AT INDIANA HARBOR.

Elaborate ceremonies marked the breaking of ground for the construction of a ship-canal from Lake Michigan to Indiana Harbor. Gov. Winfield T. Durbin of Indiana began the ceremonies by pressing a button which started two big suction dredges cutting a channel $3\frac{1}{2}$ miles long through the sands bordering the lake. Thousands attended the ceremony. Among the public officials present were Mayor Carter H. Harrison of Chicago, Congressmen Landis and Crumpacker of Indiana and Senator Charles W. Fairbanks of Indiana. The canal will be 200 ft. wide, 21 ft. deep and approximately $3\frac{1}{2}$ miles long. It will be the greatest waterway in the United States projected as a private enterprise. Indiana Harbor is exactly $17\frac{1}{2}$ miles from Chicago piers and only 6 miles from Chicago harbor. The Chicago & Great Lakes Dredge & Dock Co. has the contract for digging the canal. Three years ago Indiana Harbor was unthought of, and its site a waste of shore line. Then came the Lake Michigan Land Co. and the Indiana Harbor Development Co., both succeeded by the East Chicago Co., which will develop the harbor. Twenty factories have been established there within eighteen months. East Chicago, at the inner end of the proposed canal, and Indiana Harbor at the other, already employ close upon 10,000 men.

The Indiana harbor canal entrance is already protected by a system of breakwaters, completed early this year. The breakwaters, equipped with lighthouses, enclose a semicircular harbor, into which the canal will empty. The channel will run slightly southwest for a mile, then directly south $2\frac{1}{2}$ miles to connect with the Grand Calumet river. On completion of the canal it is expected the government will order the river dredged to a requisite depth to accommodate the largest coal and ore boats. Then the 5,600 acres of the development company's tract will have 10 miles of docks.

All Chicago was invited to the opening of the canal work. For a month Chicago's billboards and platforms of the elevated roads have carried announcements of the opening. Free tickets were supplied to all who desired to attend the ceremonies at the new town, and special trains were run over the Lake Shore road from 6:30 a. m. until 8:30 o'clock at night. It is estimated that 18,000 persons took advantage of a chance to inspect the new port.

The development company, headed by Albert De W. Erskine, has already spent \$250,000 on the new port, and will have added \$200,000 to that amount when the waterway is completed to its first turn. It will then cost \$225,000 to complete the canal. The entire work will consume almost three years, for over 4,000,000 cu. yds. of earth must be excavated. With completion of the canal the company will spend \$300,000 for bascule bridges to cross the channel.

Chicago vesselmen agree that Indiana Harbor will have a great advantage over Chicago and South Chicago as a distributing point for coal and a loading point for grain, as the new town has practically all the rail service Chicago now enjoys. As the new town will be a manufacturing port, coal and ore cargoes will figure in its trade. It has none of Chicago river's tunnel or current obstacles to contend with for grain boats.

APPROPRIATIONS FOR RIVERS AND HARBORS.

Washington dispatches deal with the annual report of Gen. Gillespie, chief of army engineers, just filed with the secretary of war. This report is, of course, largely a compilation of the reports of the members of the army engineer corps in charge of the different districts throughout the country, the essential features of which were published some time ago. The Review made a summary of reports from all the engineers of the lakes when they were first submitted to Washington. The aggregate of appropriations recommended is, however, new. The chief of engineers asks for \$11,540,703 for continuing contracts and \$20,748,990 for general river and harbor improvements, which, with \$300,000 for surveys, makes a total of \$32,589,743. The report repeats almost verbatim, the recommendations of Maj. Dan C. Kingman, in charge of the Cleveland district, dwelling upon the necessity for government storage room on the lake front and predicting that the marine hospital property will eventually be the center of the harbor. It is recommended that the government retain this property and utilize it for the construction of wharves and as headquarters for the revenue cutter and lighthouse services.

The report says that the tonnage reported from Lake Erie's chief harbors during the past fiscal year was as follows: Cleveland, more than 10,000,000, an increase of 2,500,000; Buffalo, 11,656,280, an increase of 1,110,000; Detroit (estimated), 44,000,000 (mainly through freights); Toledo, 3,866,772, an increase of

780,480; Ashtabula, 7,000,000; Erie, Pa., 3,873,734, an increase of 669,000; Sandusky, 1,357,000, an increase of 170,000.

The report names the following amounts could be profitably expended on Lake Erie harbors during 1905: Ashtabula, \$10,000; Toledo, \$266,000; Sandusky, \$143,000; Fairport, \$253,000; Conneaut, \$246,000; Port Clinton, \$2,500; Huron, \$60,000; Black River, \$355,000; Erie, Pa., \$137,000; Buffalo, \$250,000; Dunkirk, \$25,000; Detroit river, \$450,000.

STEAMER SAUBER FOUNDERED; CAPT. MORRIS LOST.

Early Monday morning the steamer W. F. Sauber foundered in Lake Superior, 30 miles off Whitefish point. The steamer had

left Ashland on Saturday afternoon with a cargo of iron ore for Lake Erie ports and had been pretty generally pounded in the gale which was sweeping across the lake. She sprang a leak and the water steadily gained on the pumps. At nightfall Sunday, when it was observed that the Sauber was in great peril, two steamers were sighted and signals of distress were displayed. One of the steamers, the Yale, came alongside and remained until the Sauber sank. Capt. W. E. Morris, master of the Sauber, and Frank Robinson,



Capt. William E. Morris.

an oiler, lost their lives, though the remainder of the crew were saved. When it was seen that the steamer was doomed the crew, with the exception of Capt. Morris, took to the yaws and were all picked up by the Yale, except Frank Robinson. Capt. Morris remained aboard the Sauber after all the others had left. When the vessel settled and finally disappeared Capt. Morris was observed floating among the wreckage and crying for help. A line was thrown to him but he was benumbed with cold and was unable to grasp it. He perished in sight of help. Robinson, the lost oiler, was in the yawl and the circumstances of his death are not known; but it is supposed that he lost his hold on the rope when it was thrown to him from the Yale. Capt. Morris was one of the best known masters on the lakes. He was born in Cleveland about fifty-four years ago. He had sailed the lakes from boyhood. His first charge was the schooner Kate Darley. His first steamer was the Brittanica, and later he sailed the steamers George Presley and Maurice B. Grover. He was appointed master of the Sauber two years ago. Capt. Morris leaves a widow and an adopted daughter. Frank Robinson, the oiler, was a resident of Detroit.

The steamer W. F. Sauber was 291 ft. keel and 41 ft. beam and was valued at \$80,000. She was built by F. W. Wheeler & Co. of Bay City for Mitchell & Co. of Cleveland in 1891. She was owned by the Inland Transportation Co., of which W. H. Becker and Martin Mullen of Cleveland are the principal stockholders, having been bought from Mitchell & Co. in 1899 for \$100,000. She was insured for \$75,000 in companies represented by Smith, Davis & Co. of Buffalo. Her cargo of ore, which was shipped by Drake, Bartow & Co. of Cleveland, was also insured.

The wreck of the Glidden in St. Clair Flats canal has now been fairly well removed, so that vessels can load to their accustomed depth. Maj. W. H. Bixby, government engineer in charge, was highly incensed at some vessel men who endeavored to pass without tugs. The package-freight lines have been especially vigorous in protesting against using tugs but Maj. Bixby holds that until the wreck is entirely removed navigation can better be safeguarded by the use of tugs. He was especially indignant at those who maintained that the regulation was projected in the interest of the tug combination.

Directors of the Cleveland & Buffalo Transit Co. met this week and declared the regular quarterly dividend of $1\frac{3}{4}$ per cent. payable on Nov. 1. General Passenger Agent Herman announces that the last trips of passenger steamers of this line will be from Cleveland Friday, Oct. 30, and from Buffalo Saturday, Oct. 31. Freight service will be continued until Dec. 1 by using the steamer Harlem, which the company has chartered as an auxiliary vessel and which will be purchased if she is found suited to the service.

According to a compilation made by the bureau of statistics, department of commerce and labor, Chicago received up to Oct. 1 of this year 229,137,000 ft. of lumber as against 226,643,000 ft. for the Tonawandas. These were the leading lumber ports. Receipts at other ports to the same date, Oct. 1, were Cleveland, 136,305,000 ft.; Buffalo, 70,868,000 ft.; Detroit, 40,605,000; Frankford, 49,437,000; Ludington, 79,398,000; Milwaukee, 62,740,000; Toledo, 34,471,000; Michigan City, 27,937,000; total 1,105,171,000 ft.

ADMIRALTY JURISDICTION EXTENDS TO CANALS.

Justice Brown in the United States supreme court has delivered the opinion of the court in the case of *Clara Perry vs. Cornelius L. Haines*, involving the question as to whether the admiralty jurisdiction of the federal courts extends to canals and canal boats. The court held that it did. Justice Brewer delivered a dissenting opinion, in which he said the position taken by the court is an undue expansion of the admiralty jurisdiction. The chief justice and Justice Harlan and Peckham joined in the dissenting opinion. The case arose over repairs to a canal boat plying on the Erie canal and grew out of an effort to enforce the state contract lien law. The enforcement was resisted on the ground that the contract was a maritime one, and therefore exempt, it being claimed that only the federal courts have jurisdiction in admiralty cases.

Justice Brown, in delivering the opinion, holds that canal boats are ships within the meaning of the admiralty law, and that, therefore, the case is one in which only the national courts have jurisdiction. He held that admiralty jurisdiction extends to canals, and said the fact that canal boats are drawn by horses and not propelled by steam did not alter the case. He declared that the line could be drawn only at rowboats. He further held that the fact that the contract for repairs made in the case under consideration was drawn on land and that the repairs were made in a dry dock could not affect the validity of the federal jurisdiction, which regards only the purposes for which the craft was constructed, and the business in which it is engaged." The employment of horses he regarded as merely an accident, and the motive power was likely to be changed with the contemplated enlargement of the canal.

"The only distinction between canals and other navigable waters," he added, "is that they are rendered navigable by artificial means, and sometime, although by no means always, are wholly within the limits of a particular state. We fail to see, however, that this creates any distinction in principle. Canals, though frequently within the limits of a single state, generally connect waters lying outside the state. In this case, the Erie canal, though wholly within the state of New York, is a great highway of commerce between ports in different states and foreign countries, and it is navigable by vessels which also traverse the waters of the Hudson river."

Justice Brewer, in his dissenting opinion, took the position that the maritime law was originally meant to cover the sea only, and that its extension to navigable streams was meant to cover only streams which are navigated by ocean-going vessels. "I do not believe," he said, "that under the true interpretation of the constitution the admiralty jurisdiction of the federal courts extends to contracts for the repair of vessels engaged wholly in commerce within a state. The Erie canal was built by the state, is owned by the state, and it cannot for one moment be assumed that the National government can interfere to restrict the state as to the size of the canal, the depth of the water, the construction of bridges, or other things in respect to which it has full control over the natural navigable waters. It seems an anomaly that when the state builds a waterway and owns a waterway, and has general control over that waterway, it cannot provide as it sees fit for enforcing claims for work on vessels navigating such highway, when the vessels are of a character which prevents their being used for any foreign commerce."

He referred to the possible determination on the part of the people of the state of New York at next week's election, to enlarge the canal, and said that if such control was given the state it ought also to be given jurisdiction of the canal. Justice Brewer further emphasized his views in the case by referring to the insignificant character of the boat on which the repairs were made, saying that while the repairs cost \$154, the vessel was sold for \$155. This fact also was used to show that the vessel was practically rebuilt and the conclusion drawn that on that account the state courts should have jurisdiction.

LOSS OF STEAMER MANHATTAN.

Another of the Gilchrist vessels, the steamer *Manhattan* is a total loss. She ran aground off Grand island, Lake Superior, on Tuesday morning while bound from Duluth to Sandusky with grain. She had sought shelter at Grand island from the storm, and in endeavoring to leave, her wheel chains parted and made her unmanageable. She brought up on a bar with such a shock that a lantern, burning in the bow of the boat, was overturned. Fire broke out and the steamer was burned to the water's edge, the crew being taken off by the tug *Ward*. The *Manhattan* was a wooden steamer and was built in 1887. She was 252 ft. long, 38 ft. beam and registered 1,545 tons. She passed to the Gilchrist fleet about five years ago, having been formerly engaged in carrying ore from Escanaba to the works of the Illinois Steel Co. at South Chicago. Her cargo of 76,000 bushels of wheat was destroyed. It was, however, fully insured as was also the steamer.

While the steamer *Gettysburg* and barges *Saveland* and *Buffalo* were trying to make the Grand Marias harbor in a storm last week the towline of the *Saveland* parted and she was carried onto the beach. Six men and one woman were rescued by the life savers. It is thought the *Saveland* will be a total loss.

COAL RECEIPTS AT CHICAGO.

The movement of anthracite coal by lake into Chicago has crossed the 900,000-ton mark, and notwithstanding there will be very little further necessity of heavy shipments of the material from lower ports, vesselmen feel that the 1,000,000-ton record of the year will be closely approximated during the remaining five weeks of navigation. Up to Tuesday of this week the records show that deliveries of coal by lake reached 900,324 tons, an increase of 700,000 tons over the year's receipts for 1902, when the strike prevailed, and were 23,000 tons more than were received during the year of 1901, when business was considered normal. The showing for the present month up to Tuesday, which aggregated 116,347 tons, was a surprise to vesselmen. The docks were reported glutted at the beginning of the month and it was expected that the deliveries would probably not reach more than 75,000 tons at the most. As it is now the month very likely will show receipts of 125,000 tons, or perhaps a little more.

Following is a comparative table of lake coal receipts for the season by months:

	1903. Tons.	1902. Tons.	1901. Tons.
April	75,326	55,316	.....
May	116,587	43,188	113,490
June	102,090	1,000	91,285
July	120,421	.....	87,443
August	165,220	.....	136,700
September	204,329	.....	149,425
*October	116,347	.....	149,425

*The receipts for October include the business of twenty-seven days, while the figures for 1901 are for a full month.

AROUND THE GREAT LAKES.

The old wooden structure that has done duty for thirty-one years as lighthouse at South Haven, Mich., is to be replaced with an all-steel structure.

The steamer *Advance*, bound from Montreal to Fort William with a cargo of general merchandise, caught fire at Sault Ste. Marie this week and was burned to the water's edge.

Surveys of the wreck of the schooner *Grace Whitney*, ashore 6 miles north of Port Huron, show the vessel to be in fair shape to be saved. She is owned by M. Sicken of Marine City.

A jury in the federal court at Duluth has brought in a verdict of \$1,000 against the Davidson Steamship Co. for damages to the breakwater at Two Harbors. The government sued to recover \$4,000.

The schooner *John Mark* sank off Kelley's island last week with a load of stone. The crew was taken off by the *Marblehead* life saving crew. The *Mark* was built in 1870. She is a total loss.

The steamer *Empire State*, purchased about two weeks ago at Detroit by B. A. Scott for \$1,550, has been sold to John McCoy of Milwaukee for \$8,500. She will be used in the Lake Michigan passenger trade.

Wireless messages from the station of the DeForest Wireless Telegraph Co. at Nottingham to the steamer *City of Erie*, 30 miles off Cleveland, were successfully sent this week. The *City of Buffalo* will be equipped with wireless telegraph apparatus this winter.

A new lighthouse marking the entrance to the Welland canal at Port Colborne has been completed. It is built of concrete and iron and stands 51 ft. high. The lighthouse is equipped with a powerful fog horn, which will be of material assistance to navigators.

One of the neatest bits of advertising issued by the lake steamship lines is the small card containing a map of Lake Michigan and the surrounding country which the Goodrich Transportation Co. of Chicago has used for a long time past. Red dotted lines show routes of Goodrich Line steamers.

Capt. Morris of the schooner *Lydia*, which was loading lumber at Menominee this week, defied several union lumber shovers to board his boat while non-union men were loading it. He stood with his rifle in hand on the deck. The captain threatened to shoot anyone who interfered but the non-union men were finally intimidated and quit.

The fishing tug *Silver Spray*, hero of many an encounter with the Canadian cutter *Petrel*, is no more. After British guns had failed to sink her she was prosaically burned to her keel in a fire at the yard of the Empire Ship Building Co., Buffalo, and thus ended an international romance. The *Silver Spray* was valued at \$5,000 and was owned by Capt. Chris Schau, of Erie, Pa.

An Ottawa dispatch announces that during the coming winter the Canada Atlantic Railway Co. will erect a 12,000,000-lb. grain elevator at Depot Harbor, its lake terminal. This addition to its harbor facilities is made necessary by the large quantities of grain brought from Chicago and Lake Superior by its steamer line for shipment abroad via the St. Lawrence river route.

The steamer *John C. Howard*, one of the two vessels completed by the Columbia Iron Works, St. Clair, Mich., has lately had a run of ill luck. She went ashore at Carleton island and secured her release by lightering 500 tons of her cargo of coal. Then she proceeded, towing the barks *Beals* and *Toledo*, and brought up on the beach abreast of Ogdensburg in a snow storm. She is reported to be leaking.

Another cargo record was smashed this week when the steamer *Mataafa* of the Steel Corporation's fleet left Chicago for

Buffalo with 268,909 bu. of grain. The shipment consisted of 185,399 bu. of corn, 40,000 bu. of rye and 43,600 bu. of wheat. This is one bushel less than the cargo of corn taken by the steamer S. J. Murphy, but it exceeds the Murphy's cargo by several tons in weight. The Murphy's cargo weighed 7,532 tons; the Mataafa's will exceed 7,550 tons.

About Nov. 5 the fixed red lens-lantern light located on the northwesterly end of the cut in Sturgeon bay leading to the canal will be moved to and shown, 16 ft. above mean lake level, from the new crib recently erected on the northerly side and at the elbow of the channel, about 330 ft. N. by W. $\frac{1}{4}$ W. from its present location. The structure is a square timber crib, surmounted by a small white house with red roof, with the lens-lantern on top. On the same day, the old crib, which is nearly in mid-channel, will be wrecked and entirely removed.

Maj. Dan C. Kingman, government engineer with headquarters at Cleveland, has, after a consultation with the commissioners of Ashtabula county, informed them that the bridge across the river bend at Ashtabula harbor is an obstruction to navigation. He called upon the commissioners this week in company with Mr. Harvey D. Goulder, Mr. M. Andrews and Mr. J. H. Sheadle. A single lift bridge is being considered to replace the present one. The probable cost will be \$165,000 and the county believes that it should be shared by the railway and dock companies.

SEEN AND HEARD ON THE LOOKOUT.

Fishermen—that is, the American and Canadian varieties—are rather pleased with the results of their past season's work, but the owners and crews of the large, clumsy barks that come over from France to get a share of the treasure that lies buried here, have no reason to boast of their success. A Dutchman, E. D. Dekker, better known by his nom de plume of "Multatuli," when walking through the woods requested his son to observe how some birds, after copiously partaking of a mess of worms, melodiously expressed their gratitude in song, upon which the son wished to be informed if the worms joined in the chorus. While the Americans and Canadians are jubilant over the success with which the pursuance of their hazardous calling has been crowned, the French fishermen have no excuse for joining in the chorus, and it is doubtful if many fishing craft sailing under the tricolor will in the future come to these stamping grounds of the codfish. Of the 400 French vessels on the Banks not one can claim to have had a remunerative season, and the failure of no fewer than twenty-five ship owners has been confidently predicted. Owing to the rigid enforcement of the "bait act," depriving them of access to Canadian bait supplies, and to the thoughtless depletion of their own periwinkle beds at St. Pierre, the end of French bank fishing is in sight, while for St. Pierre, that has nothing but its cod fishing to support it, the prospect is, to say the least of it, gloomy. A French marine journal advises the building of fishing boats with refrigerators, so that a call for bait on these shores would be unnecessary. But how are they going to procure the ice needed to keep the bait in good condition during the comparatively long trip across from France, and again, where is all the bait required on a trip to be stored? Even should we for the sake of argument agree that these questions can be satisfactorily answered, any fisherman will tell you that not only fresh bait is absolutely necessary to insure gratifying "hauls," but that the dainty cod only consents to nibble at that bait which it considers in season, namely, herring up till May, caplin during the two following months, and squid in August and September. With codfishing unremunerative, and no longer able, as in former years, to assist their visiting vessels every summer through profits made on lobster canning, their withdrawal from the scenes of former activities is soon to be expected. Not as in the case of other sections of Newfoundland's coast where laws have been enacted to preserve the lobster, the French have exterminated the crustaceans on the so-called "treaty shore" with the result of driving the cannery out of business. In this connection permit me to point out that Massachusetts has no "closed season," and though the law requiring lobstermen to sell none of their prey measuring less than 10 in. is strictly enforced, a closed season on the shores of that state might prevent the Yankee lobster from sharing the fate of the French variety.

The Canadian government has sent a sealing steamer—the Neptune—to Hudson bay with the object of expelling any American whalers found fishing in those regions, and not until next summer can we expect to hear about the success of this expedition as dog in the manger. While Canadians have never been known to engage in the whaling industry themselves, they have ever been eager to prevent American vessels from pursuing this calling in Hudson bay, and rumors of venturesome Yankees having recently started in quest of the so-called "bow-heads," great whales that frequent those waters, have caused the Canadian authorities to send out a police boat. The question now is "Can Canada close these waters against American or other fishermen?" In the early part of the eighteenth century American whalers were granted the same rights as the British in waters north of Labrador, with the understanding that the former should respect the rights of the Hudson Bay Co., and it is the contention of the Canadians that this latter clause is virtually an admission of British sovereignty. Even should America not care to dispute this claim, it may be difficult for Canada to prove ownership of whales disporting themselves in Hudson bay more than three miles from the shore, territorial jurisdiction never extending more than that distance from terra-firma.

Not long ago the brig Acacia, formerly a Nova Scotia fisherman, but of late years a freighter under the stars and stripes, arrived in New York harbor from some West Indian port. When once more ready to leave Capt. Seiffert had great difficulty in securing a crew, and this at the time when the boarding houses are full of men, as is always the case when yachts and old-timers go out of commission. It appears that upon a former occasion the Acacia's owners gave orders to their skipper not to engage union men but to hire a crew of four men at \$20 per month, the union rate for a vessel of this size being \$25. Of course, in a port like New York the non-union variety of sailor is obtainable, but boarding house keepers exact \$15 for each before one is allowed to even come near a shipping officer. Not being allowed to ship union men, and having decided to never again sample the boarding masters' stock, Capt. Seiffert carefully inspected a herd of mariners, all the members of which were what in sailor parlance is known as "on the beach." The Acacia sailed with her requisite "number" of men, but as one of them, when ordered to untie the jib cut every single stop, the men on the dock who witnessed the vessel's departure were of the opinion that she was "short handed." It is the consensus of opinion among captains that the best sailors are found neither under a boarding master's thumb nor "on the beach," but can be supplied from the union headquarters or the "free" shipping office. The question now is, "Why do captains take the generally-so-inferior article that is furnished them by boarding house keepers and for which the ship owner must pay \$15, while the services of the real thing, by some called the 'irregular regular,' can be secured without paying this \$15 bonus?" Answer to the conundrum: Because most captains accept part of the bonus! In the vernacular of the politician it is a "rake-off" or "graft," and as regards the poor ship owner a "shake-down." It is in the fall, when every boarding master has a full line of goods on hand, that ship owners should intimate to their captains that the custom of paying a \$15 bonus is obsolete, and not a vessel will be delayed on account of a scarcity of men.

It is not only that every new invention of any consequence to the world has brought its own problems along with it, but, no matter how advantageous said inventions may ultimately prove, their coming has not always been an unalloyed blessing. Warships built recently should, barring mishaps, be nearly as good a century hence as they are at present, and yet, though their cost of production mounts up into the millions, we may safely predict without much fear of successful contradiction that, say in twenty-five years from the time of their launching they will be relegated to the scrap pile, while in all probability there never was an opportunity vouchsafed them for meeting their friend, the enemy, in action. In the "Statesman's Year Book" for 1902 such English naval vessels as the Camperdown, Howe and Rodney, battleships of over 10,000 tons and launched in 1887, are recorded as "not of much value," while the Sans Pareil, which translated means "incomparable," is condemned as unfit. The latter vessel was launched in 1888. Such craft as the Repulse, Resolution and Empress of India, all warships of 14,150 tons, are now marked down to the second class, though ten years ago they were considered "non pareil," and represented the best and latest in naval architecture. They never fired a shot in actual war, and as in the British navy not one vessel built prior to 1894 can be found that still retains a place in the first class, it may be confidently expected that the last mentioned men-of-war will, ten years hence, have gone the way of all obsolete vessels. This was not so in the days of the wooden ships. Nelson fought with ships older than himself, but while modern science has given the navy more powerful ships, modern invention speedily makes its own products useless. In other words, economically inclined nations that wish to decrease the frightful mortality of their navies are advised to discover the germ or the microbe of invention. F. H.

CHANGED OPINION OF BELLEVILLE BOILER.

A wonderful change has come over British naval opinion concerning the Belleville boiler. As a correspondent of the London Globe, who accompanied the fleet during its recent maneuvers, says, the unanimous chorus of approval which has ascended from officers and correspondents alike is in praise of the Belleville boiler. A correspondent on the Good Hope says: "It will be a disappointment to such (i. e. to hostile critics of the Belleville boiler) to learn that though the Good Hope has steamed something over 2,500 miles at various speeds, from 10 to 22½ knots, she has had no trouble with her steam generators, forty-three in number, with upwards of 11,000 tubes to keep in order." When it is remembered that this ship maintained for 73½ hours a speed which was nearly double that of the best cruisers twenty years ago, it must be recognized that the propulsion of great ships has marvelously advanced in these past two decades. During the recent maneuvers the only two ships which failed to maintain the requisite speed were the Caesar and Illustrious, both fitted with cylindrical boilers. For the rest, as to speed, the London Globe says that no other navy in the world can show a parallel performance to that of the cruisers during the recent maneuvers.

An order has been booked by the Atlantic Works Incorporated of Philadelphia from the Montreal Transportation Co. of Kingston, Ont., for one of their B-11 adjustable bevel band saw machines and a 24-in. four-side planing machine to be used in the Montreal company's ship yard at Kingston.

ANNUAL REPORT OF CHIEF, NAVAL CONSTRUCTOR.

According to the annual report of Rear Admiral Bowles, chief constructor of the navy, just filed with the secretary of the navy, the following additions have been made to the effective force of the navy during the year: One battleship, four monitors, twelve torpedo boat destroyers, one torpedo boat and seven submarine boats. The list should have been increased by two battleships and five cruisers, but serious delays were occasioned by strikes and inability to get material, and on the whole the constructor regards the progress of construction as unsatisfactory. Concerning the relative progress of the battleship Connecticut, building at the New York navy yard, and the Louisiana, building at the yard of the Newport News Ship Building & Dry Dock Co., Newport News, Va., the report states that while the Connecticut is slightly behind the Louisiana, still it is well up to the average of contract-built ships. Continuing the chief constructor says:

"Better prospects for the delivery of structural steel material and the completeness and accuracy of the plans upon which the ships and those subsequently authorized are being built, furnish good grounds for believing that the future progress upon the latter vessel will exceed any results heretofore attained and that the completion of the hull and machinery will not delay these vessels beyond the contract period. During the past year the delays in the delivery of armor have caused but few delays in the delivery of vessels and much armor is now on hand in ship yards in advance of the needs of the builders. Insufficient capacity for the production of nickel steel protective deck plates have been the cause of numerous annoyances to the ship builders and has embarrassed and delayed their work to a considerable extent in the past year and is still operative."

Among the improvements recommended at the yards named are the following: At Portsmouth, N. H., new stone dry dock 400 ft. long; at Boston, a new foundry fitted with modern improvements; at New York, the construction of piers and the removal of cob dock; at League island, extension of wharves to accommodate vessels 500 ft. long. In connection with the improvements recommended for Mare Island navy yard Admiral Bowles says: "It is desirable in order that the yard may be prepared for the building of the largest vessels that preparations be made to that end."

For the Puget Sound yard it is pointed out that another dry dock is required, also a marine railway and a number of buildings. Concerning the navy yard at Norfolk Admiral Bowles says: "Being located on Hampton road, where large fleets of necessity rendezvous, this yard should unquestionably be equipped as one of the foremost yards of the country. Recently the first-class battleship Illinois came to and left the yard without difficulty. This would appear to settle the question of sufficient depth of channel." It is stated that the bureau's work continues to be embarrassed because of a lack of sufficient dry docks of capacity suited to the dimensions of the battleships and first-class cruisers.

Appended to the report is a complete list of all the vessels in the navy with elaborate data concerning them; also a summary which shows there are 252 vessels in the navy for service, twenty-five building and twenty-three unfit for sea service. Vessels fit for sea service, including those under repair, are as follows: First-class battleships, 10; second-class battleship, 1; armored cruisers, 2; armored ram, 1; single turret harbor defense monitors, 4; double turret monitors, 6; protected cruisers, 14; unprotected cruisers, 3; gunboats, 12; light draught gunboats, 3; composite gunboats, 6; training ship (naval academy), sheathed 1; special class (Dolphin-Vesuvius), 2; gunboats under 500 tons, 21; torpedo boat destroyers, 16; steel torpedo boats, 29; submarine torpedo boats, 8; wooden torpedo boat, 1; iron cruising vessels, steam, 5; wooden cruising vessels, 6; wooden sailing vessels, 4; tugs, 39; auxiliary cruisers, 5; converted yachts, 23; colliers, 16; supply ships and hospital ships, 14.

The following are under construction or authorized: First-class battleships, 14; armored cruisers, 8; protected, 9; gunboat for great lakes (not begun), 1; composite gunboats, 2; steel torpedo boats, 6; training ships, 2; training brig, 1; tugs, 2.

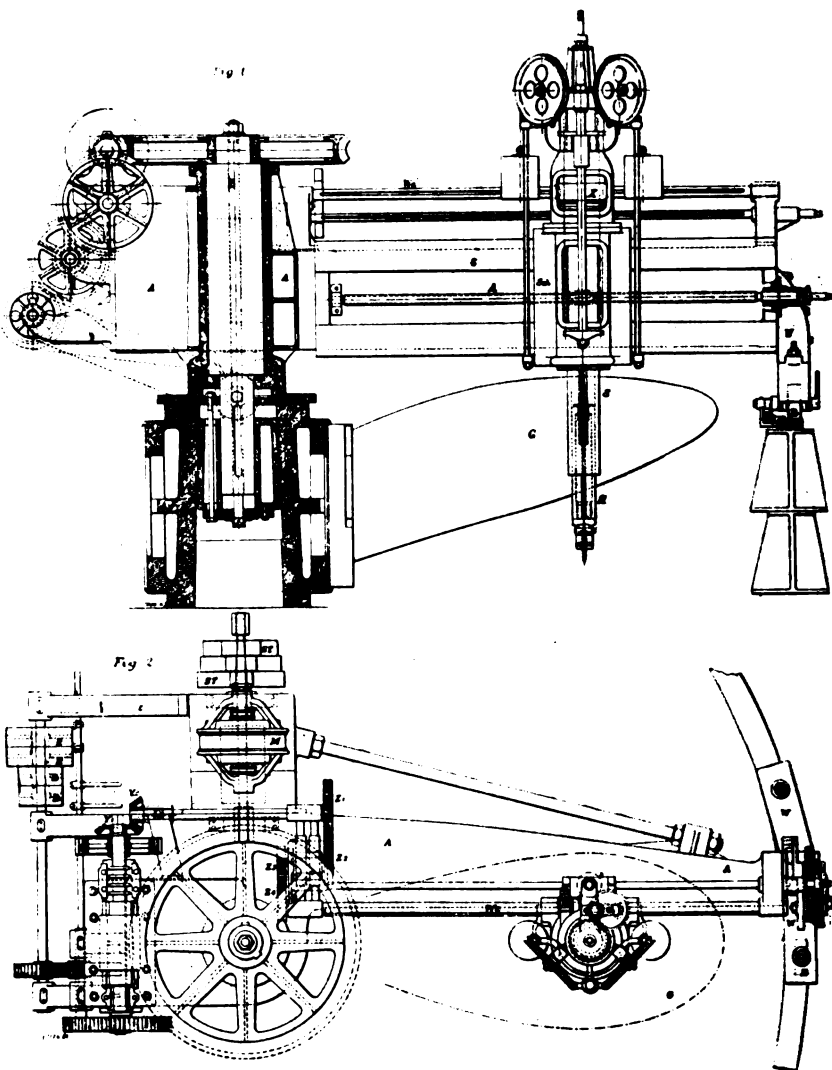
The second-class protected cruiser Denver, built by the Neafie & Levy Ship & Engine Building Co., Philadelphia, was given her trial over the Cape Ann course last week and failed to make the contract speed of 17 knots. Com'dr Cowles of the trial board gave out 16.28 knots as the average speed made by the cruiser during the run. She was delayed by some minor derangement to her machinery. She will be given another trial a little later. The Denver is the only one of her class contracted for 17 knots. The other five are required to make 16.5 knots.

The Holland-American Line has contracted with Messrs. Harland & Wolff, Belfast, Ireland, for a twin-screw passenger and freight steamer 600 ft. long, 68½ ft. wide and 48 ft. deep.

PROPELLER BLADE SHAPING MACHINE.

From Engineering of London.

An improved machine for cutting or shaping the blades of ships' propellers, which is illustrated herewith, is the invention of Dr. G. Bauer, chief engineer to the Stettiner Maschinenbau Actien-Gesellschaft "Vulcan," Stettin, and is of considerable interest to marine engineers. The blades of the propellers of the Kaiser Wilhelm II. were planed before they were fitted on the shafts, and two cuts were made to secure a perfect shape. It is equally interesting to mention that it was thought advisable to give the blades of the Kronprinz Wilhelm an after-finish on this



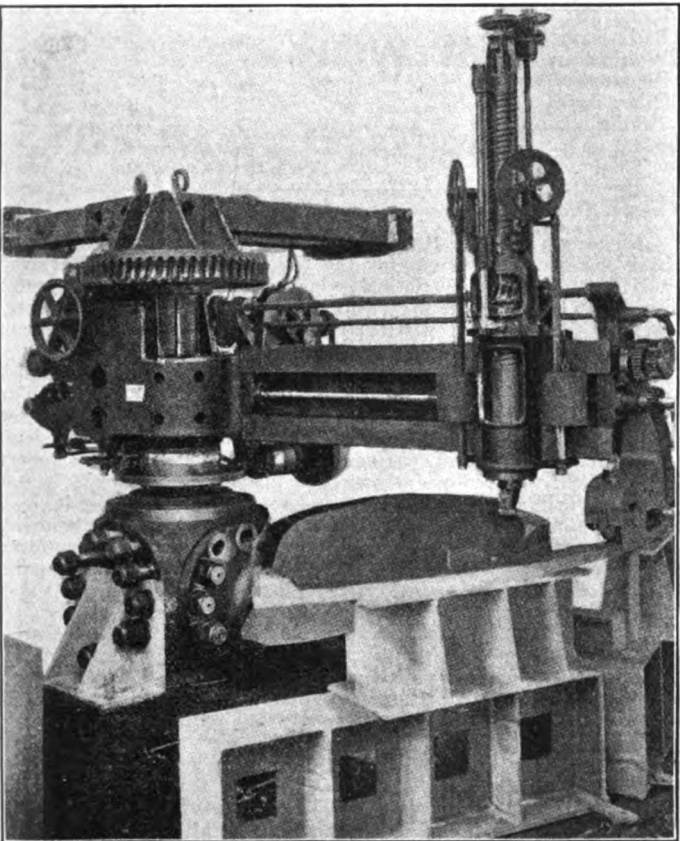
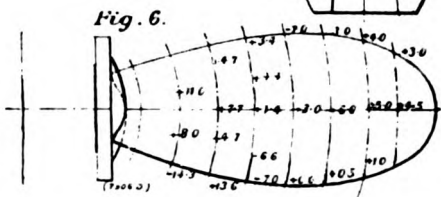
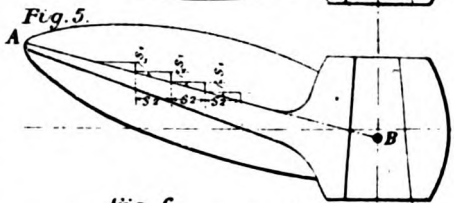
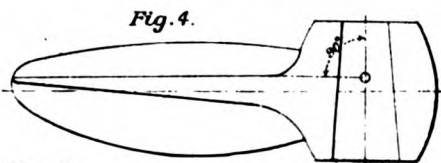
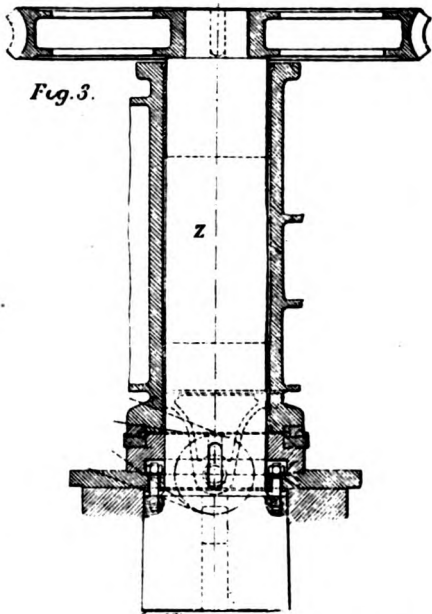
new machine. For this purpose the blades were successively sent back to Stettin, the ship's propeller being meanwhile fitted with the spare blades. What the machine performs is shown by Fig. 6, illustrating one of the blades of the Kronprinz Wilhelm before it had undergone the finishing treatment. The importance of an accurate finish for the operating faces had long been recognized; but there were no suitable machines available, and we are glad to place a description of this important improvement before our readers.

The object aimed at is attained essentially with the aid of a tool which is reciprocated in helical lines over the blade, and which is radially fed forward after having completed one stroke, thus describing a series of concentric helical lines, which cut the generating lines, and make up the desired helical face. The tool is caused to rotate by means of a supporting arm round the axis of the propeller, while receiving both axial and radial advances. The method is applicable for shaping propeller blades to any generating lines. The generating line may be at right angles to the axis or inclined to it; it may also be a broken line with different inclinations to the axis in its different portions.

A photograph of the machine which performs these operations is given in Fig. 7; Figs. 1 and 2 are sectional drawings. The illustrations represent the actual machine which has been used for finishing the propeller blades of the Kaiser Wilhelm II. and of the Kronprinz Wilhelm, except that the diagrams indicate a few minor improvements since effected. The boss of the blades to be shaped is fixed to a plane cast-iron bedplate, and the blade mounted in the actual manner in which it is afterwards to work. The pressure face—i. e., the face which will press backward upon the water as the ship is going forward—is turned upward. A strong pivot Z (Fig. 3) is fixed in the bore of the boss, about which the heavy cast-iron arm A (Figs. 1 and 3) revolves; the outer extremity of this long arm is supported by the carriage W, running with two wheels on a guide-path. The pivot Z is stationary, and the rotation of the arm is produced by a worm

wheel, keyed to Z, and a worm which is mounted on the arm together with the motor M; the gearing comprises the pulleys R, the step cones S T, and several wheel trains.

The tool, an ordinary planing steel, is, for reasons presently to be explained, not directly mounted on the tool-holder S, but in a sliding-piece H. The tool-holder S moves up and down, and is borne by a carriage Sch., traveling in guides all along the radial arm A. In scraping the propeller blade G, the tool describes, as was already pointed out, helical lines. Having made one cut, the tool travels back to the starting point of its operating stroke, following the same path. The forward feed is then imparted to the tool, which now makes a fresh cut, is taken back and again advanced, and so on. The operation is therefore the same as in a shaping machine, except that this new machine moves in helical and not in straight lines. This helical motion is produced by the combination of the vertical up-and-down movement with the rotatory movement of the arm, and the pitch of the helix depends upon the adjustable ratio of the two veloc-



ities. The vertical movement of the tool is obtained with the aid of a helical thread, cut upon the tool holder S; this thread engages with the worm-wheel X, fixed in the carriage Sch. The worm-wheel is driven through the intermediation of the shaft We, the toothed wheels Z', Z'', etc., and the bevel wheels Y', Y'' from the main worm which rotates the arm A. It will thus be clear that the two movements of the tool, the vertical movement of S and the rotation of the whole arm A, are independent of each other, and that the ratio of the two velocities can be varied with the help of the change wheels Z', Z'', etc. It is in this way that the machine is set for cutting helical surfaces of different pitches. The reversing mechanism of the machine, which returns the tool to the starting point of its stroke, does not differ from the construction usually to be met with in large modern planing machines.

Having explained the operation of the machine in its general features, we have to refer to the special points which concern the feed mechanism. We will first describe the arrangement adopted when the two lines are normal to one another, as in Fig. 4. When the arm has traveled a certain distance beyond the blade, a roller which is attached to the levers will run on a stop on the guide-path. As a result, the slide which carries the tool holder is advanced through a small distance, and this movement is produced with the help of a spindle-nut fixed in the interior. On its next operating stroke, the tool will describe a curve parallel to the one just completed. The displacement is controlled by the change wheels and the spindle mentioned. The arrangement becomes slightly more complicated when the generating line is inclined at an angle to the axis; this case will better be understood from the diagram, Fig. 5. An axial advance is required under this condition in addition to the radial feed. It is to meet this condition that the tool is not directly mounted in its tool holder S, but in the sliding piece H, which can be displaced within the tool holder by the aid of a screw spindle. In order to ensure the desired inclination between axis and generating line, the proper ratio has to be maintained between the axial and the radial feed. In the case illustrated, the tool is, at the completion of each stroke, raised by the distance s', and advanced outward by the distance s'', thus producing a blade surface in accordance with the generating line A B. The spindles for imparting the radial and the axial feeds must be in positive connection, and special gearing is provided for this purpose.

When the propeller blade has to be shaped whose generating line forms an acute angle with the axis, the operation will be as follows: The tool cuts a helical line on the surface, passes beyond the blade, and returns in the same line, again travelling beyond the blade. At a certain point, the adjustments are made for the radial and axial feeds, the movement is reversed, and the new cut commences. The tool itself is an ordinary cutter bar, whose cutting edge is suitably inclined to the face upon which it works. Since, however, the surface slope diminishes as we approach the top of the blade, it might be thought that the tool would frequently have to be changed during the shaping of one blade. As a matter of fact, however, that a blade may almost be completed with one tool, provided the cutting angle be suitably adapted to the average slope of the blade. The tool is, of course, pivoted as in a planing machine, so that it can be deflected during its return stroke, and glide over the blade without meeting any resistance.

The machine represented in the photographic view can deal with screw propellers up to 7 meters (23 ft.) in diameter. The pivot Z', about which the arm A turns, has a diameter of 400 millimeters (15 3/4 in.), and the arm a length of about 4 meters (13 ft.), measured from center to center. When the machine has been fixed in the boss, which is done with the aid of a strong cone, the height from the upper edge of the bedplate to the upper edge of the worm wheel is about 3,300 millimeters (10 3/4 ft.); reckoned up to the highest point to which the change wheels may reach, the height is 5 meters (16 1/2 ft., roughly). Complete with bed plate and guides, the machine weighs 40 tons. With a feed of 1 millimeter (1-25 in.), the machine can, without difficulty, take a cut 6 millimeters (1/4 in.), in thickness; that is a high efficiency. A blade of the Kaiser Wilhelm II. was shaped in 150 hours, a roughing as well as a finishing cut being made in this time. The blade has a length of 2,500 millimeters (8 1/4 ft.), and a surface of 3.46 square meters (not quite 37 sq. ft.). Only one man is required for attending to the machine, and the operation is, therefore, inexpensive. The machine further affords a ready means for testing whether a blade has the proper shape, and this to a degree of accuracy which was not so far attainable with any instrument. For this purpose, the blade is provisionally clamped to the boss, and the tool is passed over different portions of the blade. We then see at once whether: First, the pitch of the blade is correct; second, the inclination of the generating line is correct; third, the shape is not otherwise irregular.

The blade is first turned until the pitch is as nearly uniform as possible all over the face; we then raise it by props until we get the correct inclination for the generating line. Any inaccuracy which remains afterwards noticeable has to be removed with this machine. In spite of careful workmanship, the very best blades that we can at present produce have spots which will deviate by several millimeters from the desired curvature. In Fig. 6, those deviations are marked in millimeters. The plus indicate that the blade in question—one from the Kronprinz Wilhelm—was too thick at the respective spots; the minus that the real surface did not reach up to the intended theoretical surface. The plus tell us, in other words, to what depth the tool should

Fig. 7.

abrade; the *minus* by how much the marked spots will be under the surface of the first cut. The blades of the Kaiser Wilhelm II., after having been machined, have proved theoretically perfect in shape under minute examination.

DREDGING IN NEW SOUTH WALES.*

By Cecil West Darley, M. Inst. C. E.

The eastern boundary of New South Wales extends from Point Danger in the north to Cape Howe, the southern limit, a distance of about 610 miles. Some sixteen rivers, all more or less navigable, discharge along this coast, most of them passing through large areas of rich and closely settled agricultural lands. As the rivers form the natural outlets, and often indeed the only means, for sending produce to market, the government have expended considerable sums in improving their navigation. A great amount of dredging has thus been involved, not only in the upper reaches of the rivers, where they are liable to shoaling after floods, but, as they nearly all have sand-bars across their entrances, extensive works in the way of training-walls and breakwaters have been carried out to confine and direct the scour, and much dredging has had to be resorted to in straightening the channels and deepening the bars. The circumstances and conditions connected with such dredging have rendered necessary the provision of a large, and, in some cases, special plant for the work.

The following dredges are now available in New South Wales:

Ladder-dredges (five double and nine single ladders) fourteen; grab-dredges (Priestman type), twelve; suction-dredges (self-propelling hopper type), five; suction-dredges (pontoon type—ordinary suction), four; suction-dredges (pontoon type with clay-cutting gear), two; suction-dredges (combined suction and grab crane type), seven; total forty-four; all of which, with two exceptions, have been designed and built in Sydney.

The first two classes call for no special remark, as many similar dredges are to be seen working in England. One of the suction-dredges, named Antleon, of the self-propelling hopper type, which was designed for working on exposed river bars, is worthy of notice. This dredge was built by Messrs. Simons & Co., Renfrew, specially for bar work. The dimensions are 165 ft. by 35 ft. by 8½ ft., and it is capable of carrying 250 tons of sand in the hopper on a draught of 5 ft. The Antleon is fitted with Babcock & Wilcox boilers, supplying steam at a pressure of 150 lbs. per square inch to four independent sets of triple-expansion engines; two pairs for working twin screws and two pairs for the centrifugal pumps. This vessel is reserved for deepening river-bars which are liable to shoal when certain winds prevail. The dredge does not anchor, but steams slowly ahead over the bar, passing out or in, dragging the suction-pipes and pumping at the same time, filling the hopper with 250 tons of sand in about twenty minutes. On one occasion, working on the Macleay river bar, 8,000 tons of sand were raised and discharged at sea in twenty-seven and a half working hours; and during the year ending June, 1901, this dredge raised and discharged at sea 202,850 tons at a cost of 3.49d. per ton. This includes all cost of moving from place to place, delays, and repairs, but no allowance for a sinking fund. On some occasions, when a bar has been too shallow to pass over, the vessel has had to dredge from the outside, and stand out to sea or seek what shelter the nearest headland afforded, during bad weather.

A fleet of some eighteen tug-boats has been provided for attending the dredges, and for towing silt-punts out to discharge at sea from ladder-dredges, etc. Formerly much loss of time was occasioned to the ladder dredges when it was too rough on the bar or outside to tow the silt-punts out. At Newcastle, where the heaviest amount of ladder-dredge work had to be performed, it was estimated that some five or six weeks per annum was lost from this cause, which greatly enhanced the cost of dredging, but since the advent of sand pumps all the material raised is used for reclamation purposes, thus keeping the ladder dredges continually at work.

Very extensive reclamations are being made in Sydney, at the heads of bays and other places, where there are large areas of shallow water of no use for navigation purposes. A space is enclosed by a training wall, and a suction dredge is moored close by, with a good length of floating delivery pipes. The dredge commences by excavating a sufficient area to a suitable depth, and the silt pumps are towed up and discharged on one side of the pump dredge, a little distance off, the dredge moving, about every second day, to where the punts have previously been discharging, and the punts then discharge where the dredge has last been. At Newcastle an extensive island is being formed over a mud flat at the head of the harbor. Some 200 acres are being enclosed by training walls and a large sand pump, the Castor, is stationed there, landing all the silt raised by the ladder-dredges. This dredge has 30-in. suction and discharge pipes, and engines of about 900 H. P. During the year ending June, 1900, 1,716,573 tons of sand were landed, at a cost of 0.52d. per ton, including all repairs. To give the dredge freedom to move about, ample length of floating pipes is provided, the pipes being connected with gimbal joints and leather sleeves. Each pipe is about 27 ft. in length, and is carried on a small pontoon about 15 ft. square by 2 ft. in depth. The pipe is led on shore and extended by adding new pipes from day to day as the reclamation advances.

The dredges fitted with clay-cutting gear revolving round the suction pipes are valuable for dealing with hard deposits or for cutting new channels through tough or hard clay formations.

*Paper read before the Institute of Civil Engineers, London.

Two types of these have been constructed, the first having the Von Schmidt system of cutting gear fitted on a pontoon 116 ft. by 50 ft., by 10 ft. in depth, with semi-circular ends. A table running on rollers and a rack is fitted at one end. This table is pivoted, and is capable of being traversed from side to side round the semi-circular end. The suction pipe comes up through the center and practically forms the pivot. On the table is carried the engine for driving the cutters, traversing gear, etc. The suction pipe crosses the table and turns down vertically, and is slung therefrom. It is telescopic, and to its lower end is attached the circular cutting frame which is 8 ft. in diameter. The cutters are driven through a 6-in. vertical shaft, which passes down close outside the suction pipe. This shaft, which has key-ways cut along its whole length, passes freely through the center of a large crown wheel, fitted with keys to drive the shaft, and is lowered out with the suction pipes. This dredge works to a depth of 20 ft., and finishes to a very uniform bottom.

The second type of dredge has the cutters also fixed to the suction pipe, but in this case two suction pipes pass through the sides of the vessel from the pump, and are joined together in the form of a bow round the end of the hull, the suction pipe and cutting frame being fixed in the center of the bow. The whole pipe and cutter are raised or lowered by an ordinary rope tackle, but the cutters are driven through an 8-in. shaft. This has two key-ways, and passes through the center of, and is driven by, a large worm wheel, 5 ft. in diameter, the worm having a pitch-diameter of 1 ft. 7½ in. The cutting gear for this dredge was designed by Mr. George Higgins, but the system for attachment was designed and the whole of the work carried out at the government workshops in Sydney.

The total amount and cost of silt, etc., raised in New South Wales waters during the year ending June, 1900, was as below. It may be interesting to show how the time of the dredges is occupied, on an average, as it is obvious that only for a portion of the time are they actually employed dredging.

	Tons.	Hours dredging.	Cost pence per ton.
By ladder dredges.....	2,857,428	20,509	3.37
By sand pumps.....	3,902,276	12,432	2.15
By grab and sand pump.....	980,815	12,753	2.84
By grab dredges	414,980	20,125	5.71
	8,155,499	65,819	3.33

Say 6,343,172 cubic yards at 4.28 pence per cubic yard.

The grab dredges are usually employed on the smaller rivers dealing with gravel and shingle bars. The combined pump and grab dredges are also stationed on small rivers, and are found to be a useful kind of dredge, as often hard bars of shingle are met with which the pump cannot raise, and the grab can be brought into use to clear the obstruction.

AVERAGE FOR ONE YEAR'S WORK.

	Twelve ladder dredges.	Ten sand-pump dredges.	Seven combined sand pump and grab dredges.	Two grab-dredges
Dredging	63	49	61	62
Coaling	2	2	2	3
Removals	9	14	16	8
Bad weather	3	2	2	3
Waiting punts	3	—	—	2
Repairs	19	25	16	15
Other causes	1	1	3	7
Taking silt to sea	—	7	—	—
Total	100	100	100	100

TRIUMPH OF NICLAUSSE BOILER.

The trip of the battleship Maine to Culebra, Porto Rico, and back has been a triumph for the Niclausse boiler. She arrived at Hampton Roads on Saturday last, and Capt. E. H. C. Leutze immediately proceeded to Washington and called upon the secretary of the navy. A particularly gratifying feature of the run to the officials was the absence of the slightest mishap to the boilers. The boiler test was managed by Capt. J. A. B. Smith of the New York navy yard, Com'dr Bailey and Lieut. Com'dr Parks. The special board in its report will approve the Niclausse boiler for use in battleships and will sustain the opinion of Lieut. Com'dr Bartlett, chief engineer of the Maine, that the recent trouble with the Maine's boilers was through an automatic water gauge attachment, and was not due to any defect in the boilers. It was found that they worked perfectly and were easily handled, notwithstanding the fact that a large part of the fire-room force were green men. The board will recommend to the navy department that the Maine be equipped with new evaporators, as it was found that those installed are not of the best type.

The trip to Porto Rico and return was timed between Currituck light and Culebrita light, a distance of about 2,400 miles, which was made at an average speed of 15.12 knots, or 17.77 miles per hour. On the trip down the Maine steamed for fifty-two consecutive hours at 17 knots. The return trip was made at an average of 15.9 knots, and for an hour and three-quarters she ran at a speed of 18 knots. This was accomplished without forced draught, and, with the exception of this spurt, no effort was made to speed the vessel. The heating of the engines gave some slight trouble, but in the opinion of all officers on board the Maine could easily have maintained 17 knots for the round trip.

ELECTRIC ATTACHMENT TO NEPTUNE SHIP LOG.

Thomas Walker & Son, 58 Oxford street, Birmingham, Eng-land, have lately brought out an electrical attachment to their famous Neptune ship log, which enables the readings to be taken in any part of the ship as desired. By the use of this instrument the distance run, as registered by the log on the taffrail, is also recorded in the chart room, or in any other part of the vessel as desired, thus enabling the officer of the watch to take the log reading himself instead of having to rely upon the care and accuracy of the seaman who is sent aft for that purpose. The chart room electric register records the distance traveled and shows every tenth of a mile registered by the taffrail log aft. Inside the log-case is an electric contact-making device so constructed that an electrical contact is made every tenth of a mile. This contact is quite uniform, whatever the speed may be, and cannot by any possibility remain closed when the log ceases to work, or be repeated by any "chattering" of the contact, however violent the vibration of the vessel may be. To the log is attached a flexible insulated cable, connected electrically to the contact-maker inside the case. When the log is in use the outer end of the flexible cable is also connected electrically by a strong brass union to a watertight connection box fixed permanently to the taffrail. From this connection box run two insulated wires through the vessel to a set of electric batteries and the chart room register. There is thus a complete electric circuit between the log register aft and the electric register in the chart room, and at every tenth of a mile traveled an electric impulse is sent through the circuit actuating the electric register whose dial will record the same distance as that registered by the log. These instruments have during the past two years been subjected to lengthy trials under the severest possible conditions with great success and the firm has every confidence in recommending them to captains and ship owners as a valuable and thoroughly reliable assistance to navigation. The firm has received letters from a variety of sources commending the accuracy of the electric reg-ister. Examples of the new electric log are now to be found in the Russian and Austrian navies and in the ships of the Cunard, White Star and African steamship companies fleets. The Nep-tune log is of course well known through agencies in this coun-try and is extensively used on the great lakes as well as on the seaboard.

In order to prevent the sheriff of Union county, New Jersey, from selling the cruiser Chattanooga at the Crescent Ship Yard, the navy department forcibly took possession of the cruiser with the aid of seven tugs last week and towed her to the New York navy yard. At the same time they took along the torpedo boats Nicholson and O'Brien. The sheriff's watchman was on board the Chattanooga at the time and they took him along too.

ANNUAL REPORT OF REAR ADMIRAL RAE.

Rear Admiral Charles W. Rae, who succeeded Rear Ad-miral Melville as chief of the navy bureau of steam engineering, has submitted a detailed report of the operations of that bureau for the past year, which involved a total expenditure of \$3,216,177, most of which was expended in labor in navy yards and in the purchase of material and machine tools. He requests the detail of junior line officers as assistants to the naval inspectors of ma-terial, in order that their training may fit them for the important duties of inspectors in charge. Admiral Rae says that the work of following through every process the making of condenser tubes, boiler plates, steel castings and steel forgings for ma-chinery should always be in the hands of those most interested in getting the very best results in the finished products. During the past year there was completed the extended series of tests projected by the bureau for determining the value of liquid fuel for naval purposes. The fact that these tests were made under a boiler capable of being forced to 2,000 H. P., and that an extended series of experiments had been previously made under the same boiler with coal as a fuel, made it possible to secure comparative results as to the relative economic and practical values of the two combustibles. It is hoped to have the complete report of the board ready for distribution in a few months. Ad-miral Rae says that the report will be of inestimable benefit to the manufacturing, maritime and naval world, and will show the far-reaching benefits of careful, conscientious and extended experimental investigation. "Neither in extent nor in character," says he, "have these tests been equaled either at home or abroad and the bureau feels assured that when the results of the exper-iments are made known that the necessity and advisability of conducting extended investigation in other directions will be made manifest."

At the annual meeting of the stockholders of the Consoli-dated Lake Superior Co., held in Connecticut this week, the fol-lowing directors were re-elected: Gordon Abbott, E. J. Berwind, F. H. Clergue, Cornelius Shields, Lynde Harrison, Horatio G. Lloyd, H. K. McHarg, Charles McDonald, Charles E. Orvis, George Philler, S. M. Prevost, Samuel Rea, T. C. Search, James S. Swartz and Charles H. Tweed. As the company is in the hands of a receiver no further action was taken. Another meet-ing will be held on Nov. 24.

Low rate for Thanksgiving via the Nickel Plate road for points within 150 miles from place of starting. Tickets on sale Nov. 25 and 26, good to return till Nov. 30, 1903, inclusive. See nearest agent or address E. A. Akers, C. P. & T. A., Cleveland, O. 207, Nov. 30

BELLEVILLE WATER-TUBE BOILERS

NOW IN USE (SEPTEMBER, 1903)

On Board Sea-going Vessels, NOT INCLUDING New In-stallations Building or Erecting.

French Navy	-	-	-	-	-	-	-	355,560	H. P.
English Royal Navy	-	-	-	-	-	-	-	929,300	"
Russian Imperial Navy	-	-	-	-	-	-	-	227,500	"
Japanese Imperial Navy	-	-	-	-	-	-	-	122,700	"
Austrian Imperial Navy	-	-	-	-	-	-	-	56,700	"
Italian Royal Navy	-	-	-	-	-	-	-	13,500	"
Chilian Navy	-	-	-	-	-	-	-	26,500	"
Argentine Navy	-	-	-	-	-	-	-	13,000	"
The "Messageries Maritimes" Company	-	-	-	-	-	-	-	87,600	"
Chemins de fer de l'Ouest: (The French Western Railway Co.)	-	-	-	-	-	-	-	-	-
plying between Dieppe and Newhaven	-	-	-	-	-	-	-	18,500	"
Total Horse Power of Boilers in Use	-	-	-	-	-	-	-	1,850,860	

Société Anonyme des Etablissements Delaunay Belleville

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OUR SHORTAGE IN SHIPS.

By Walter J. Ballard.

The issue for August of the monthly publication "Commerce and Finance," published by the department of commerce and labor, gives a list of the steamships sailing regularly from ports of the United States. These vessels are the carriers of our foreign commerce, which, in 1903, fiscal year, amounted to \$2,445,000,000 in value. An analysis of this list brings graphically before our minds the shortage in ships flying the American flag. The analysis follows:

From New York to Europe, 26 steamships, thus divided as to nationality: British 118, German 62, Italian 18, Austrian 14, French 14, Dutch 10, Danish 10, Spanish 7, American 6, Belgian 4, Portuguese 2.

From New York to Australia, all British, 80.

From New York to Africa, 12; British 11, German 1, American 0.

From New York to China, Japan and Far East, 17; British 16, German 1, American 0.

From New York to South America, 50; British 44, German 4, Belgian 2, American 0.

From New York to Cuba, West Indies and Mexico, 71; American 22, British 14, German 10, Dutch 9, Norwegian 8, Cuban 5, Spanish 3.

From Baltimore to foreign ports, 73; British 43, German 17, Norwegian 7, American 3, Dutch 2, Russian 1.

From Boston and Charlestown to foreign ports, 74; British 45, German 11, American 9, Danish 4, Norwegian 4, Dutch 1.

From Newport News to foreign ports, 18; British 11, German 4, Dutch 3, American 0.

From Portland, Me., to foreign ports, all British, 6.

From Passamaquoddy, Me., to foreign ports, 4; British 2, American 2.

From Galveston to foreign ports, 249; British 202, German 20, Italian 12, Austrian 6, Danish 5, Spanish 3, Norwegian 1, American 0.

From Mobile, Ala., to foreign ports, 43; Norwegian 24, British 16, Cuban 1, German 1, Dutch 1, American 0.

From New Orleans to foreign ports, 127; British 60, Spanish 20, Norwegian 13, German 10, Italian 8, Austrian 5, American 5, French 4, Danish 2.

From Pensacola to foreign ports, 44; Austrian 20, British 15, Spanish 5, Italian 2, German 1, Dutch 1, American 0.

From Alaska to foreign ports, 39; American 31, British 8.

From Tampa, Fla., to foreign ports, all American, 3.

From Hawaiian ports to foreign ports, 15; British 6, American 6, Japanese 3.

From Port Townsend, Wash., to foreign ports, 88; British 53, American 16, German 13, Japanese 6.

From San Francisco to foreign ports, 61; American 26, German 18, British 11, Japanese 3, Norwegian 3.

From Philadelphia to foreign ports, 64; British 33, German 14, Norwegian 7.

From Porto Rico to foreign ports, 37; Spanish 21, French 6, German 5, Cuban 2, American 2, British 1.

In the last paragraph, Porto Rico, we have the only instance of British ships at the bottom of the list.

In the above summary there are 1,368 steamships. By flags they were divided as follows:

British	723	Danish	23
German	192	Japanese	12
American	133	Belgian	10
Norwegian	67	Cuban	8
Spanish	59	Portuguese	2
Austrian	45	Russian	1
Italian	40		
Dutch	29	Total	1,368
French	24		

British ships carry more than half, German ships nearly 15 per cent., and American ships less than 10 per cent. of American foreign commerce. In addition, we must remember that 68.4 per cent. of American Philippine commerce is carried in foreign vessels.

This is a shortage of American ships which should inspire the incoming congress to immediate action towards the stoppage of the tremendous yearly loss of freight monies and the restoration of our one-time merchant marine prestige on the high seas.

The formal announcement of the reorganization of the Consolidated Lake Superior Co. has been made by the reorganization committee. The printed announcement does not differ from the details of the plan which have been given out from time to time. The new company will be capitalized at \$40,000,000. Forty-year 5 per cent. gold bonds will be issued to the amount of \$10,000,000, and an issue of 5 per cent. twenty-year gold income bonds to the amount of \$3,000,000 will also be made. The plan provides for the raising of \$8,000,000 needed by the company.

Lieut. Comdr Martin Bevington of the Asiatic squadron, United States navy, died at the home of his mother at Mansfield, O., this week. He had been chief engineer on the battleship Kentucky when he was recalled on sick leave. He was born at Butler, O., forty-six years ago and graduated from Annapolis in 1879. In 1895 he served on the Columbia when she went to Bluefields, Nicaragua, to subdue threatened trouble. During the Spanish-American war he was inspector of material of steam vessels at Washington.

NEW CHARTS.

John D. Potter, admiralty chart agent of 145 Minorities, London, announces the following list of new charts:

1859. England, west coast—King road.
 3337. England, east coast—River Thames, London bridge to Woolwich.
 1471. Ireland, east coast—Kingstown harbor.
 3345. France, northwest coast—Chenal du Four.
 3342. Greece—Port Kaio. Githion.
 3317. Newfoundland, east coast—Thimble Ticks to Bagg head, including New bay.
 3373. West Indies—Puerto Rico island, Mayaguez bay.
 478. West Indies—Puerto Rico, Port San Juan.
 3376. Plans on the north coast of South America—approaches to Guanta harbor; Guanta harbor.
 3318. South America, west coast—St. Elena point to Gulf of Dulce.
 3327. Mexico, southwest coast—Cape San Lucas to Espirito Santo and Sta. Margarita island.
 3193. Philippine islands—Port Sebu and approaches; Sebu anchorage; Tinao anchorage.
 3329. China, east coast—Mirs bay, Tolo harbor and adjacent anchorages.
 3334. Japan, Nipon island, east coast—Tokyo to Sendai bay.
 2055. Nipon, south coast—approaches to Shimoda harbor.
 1045. Nipon, Kii channel—Tanabe Wan.
 3375. Plans on the south coast of Japan—Hososhima Ko, Shimizu Ko.
 3332. New Zealand, North island, east coast—Mercury bay to Town point.
 479. West Indies—anchorages in Puerto Rico island; plan added, Port Arecibo.
 632. Walfisch bay to Orange river, new plan—Possession road.
 2507. China sea, Banka strait, plan added—Muntok road.
 1622. Ports in the Philippine islands, plan added—Parasan harbor and approaches.
 3216. Japan, plans on the east coast of Nipon island, plans added—Oginohama ko; Hirota Wan.
 357. Japan, harbors in Kii channel, new plan—Osaki bay.

Nelson's flagship, the Victory, was nearly sunk in Portsmouth harbor last week by the battleship Neptune. The Neptune, a non-effective vessel of 9,310 tons displacement, built in 1874, which was being towed into Portsmouth to be broken up, broke adrift. After much effort the Neptune was secured by the battleship Hero, but not before the Neptune had knocked a 6-ft. hole in the Victory's port quarter. The Victory's lower decks were quickly flooded and she began to settle, with her crew standing at quarters, but the speedy arrival of tugs enabled the old flagship to be kept afloat until she was docked.

66 x 10¹/₂ Steamboat For Sale.

Fitted with 6-12 x 6 fore-and-aft compound condensing engine and Roberts boiler.

Upper works to suit.

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Chester, Pa.

SHIPPING TRADE OF HAMBURG.

The particulars published by the bureau of commercial statistics at Hamburg record the fact that vessels belonging to all the maritime nations participate in the traffic of that port. The number of arrivals of all nationalities last year was 13,297, while those of 1901 amounted to 12,847. The shares of the various flags in the two years are shown in the following table:

	1901.		1902.	
	Ships.	reg. tons.	Ships.	Reg. tons.
United States	4	5,984	1	2,147
Argentine	—	—	1	1,068
Belgian	14	16,820	18	19,216
Brazilian	1	1,936	1	121
Danish	443	138,028	424	132,849
German	7,335	4,473,796	7,688	4,656,040
French	79	87,507	82	94,805
Greek	8	12,676	23	37,805
British	3,510	2,944,147	3,586	3,125,906
Italian	33	52,178	26	58,436
Dutch	547	114,351	671	124,459
Norwegian	476	283,589	407	231,809
Austro-Hungarian ...	18	37,600	28	61,410
Russian	46	35,759	44	28,829
Swedish	262	96,256	268	100,752
Spanish	71	82,738	49	51,582
Total	12,847	8,383,365	13,297	8,727,294

It will be seen that more than a half of the traffic of the port was carried on last year under the German flag, i. e., 53.25 per cent., while the British tonnage was 35.80 per cent. of the whole; this is a trifling addition to the German average for the four years 1899 to 1902 (52.60), and a very slight falling off of the British average for those years (35.95). The flags which increased their share in the Hamburg shipping trade last year were the Argentine, Belgian, German, French, Greek, British, Italian,

Dutch, Austro-Hungarian and Swedish, the progress made by the Greeks being the most marked. The flags that lost ground were the American, Brazilian, Danish, Norwegian, Russian and Spanish, the loss on the part of the United States and Brazil being the most pronounced.

A company has been organized to erect and operate the Ferris wheel during the St. Louis exposition. The engineering work involved in taking down, transporting and re-erecting the wheel has been intrusted to Robert W. Hunt & Co. It is estimated that the work will involve an outlay of about \$125,000. It will be under the direction of Mr. L. V. Rice, who superintended the original erection of the wheel at the Columbian world's fair, its subsequent taking down and removal and re-erection at its present site in North Chicago. As this will be the only structure from which the whole Louisiana exposition can be viewed, and as there will not be any towers or other high novelties to compete with it, the success of the wheel at the Chicago fair will probably be repeated.

Mr. T. J. Heller, well known to users of roller bearings in the east, has taken the sales management of the ball business of the Standard Roller Bearing Co., who recently purchased the ball business of the Grant Tool Co. Mr. Heller's address will be care of the Standard Roller Bearing Co., Forty-eighth and Girard avenues, Philadelphia.

Duck and quail hunters—Half-fare rates to parties of three or more traveling together on one ticket via Nickel Plate road to McComb and Payne, O., and points between those stations; also to South Whitley and Will Vale, Ind., and intermediate points. Tickets on sale Nov. 9 to 30, inclusive, good to return till Dec. 3, 1903. See nearest agent or address E. A. Akers, C. P. & T. A., Cleveland, O. 201, Nov. 30

Galveston, Texas, Oct. 7, 1903.

Sealed proposals, in duplicate, for grade raising at Galveston, Texas, involving over 11,000,000 cubic yards of filling, will be received by the Chairman of the Grade Raising Board, until 2 P. M., Dec. 7, 1903, and then publicly opened. For information apply to E. R. Cheesborough, Secretary Grade Raising Board, Galveston, Texas.

Dec. 8 C. S. RICHE, Consulting Engineer.

Gasoline Launch for Sale.

Gasoline launch, 7½ by 35 ft., 12 H. P., double cylinder engine; canopy top, new curtains, leather cushions; lights; staunch and speedy, all complete. Cost \$1,800; will sell for \$1,200. Must sell to close estate. Wm. J. St. Aubin, 538 St. Aubin ave., Detroit, Mich. Nov. 5

Patent Rights on Life-Saving Appliance.

For Sale.—In part or as a whole. The patent rights issued and pending on a high grade steel life-saving appliance for use on board ships at sea. Correspondence solicited from gentlemen of large influence in maritime affairs or manufacturers of ship fittings. Price nominal. Appliance is thoroughly standardized on a commercial basis and highly endorsed. Address Box 52, the Marine Review Pub. Co., Wade Bldg., Cleveland. Nov. 5

Dredging Plants for Sale.

For Sale.—Two dredging plants complete, consisting of two dredges, tugs Maytham and Duncan Robertson; also five dump scows and two flats, with sundry duplicate parts of machinery, etc.; also extra spud anchors and dipper teeth, etc.; all having been kept up in good working condition and comparatively new, and could be delivered at once on satisfactory sale. For further information as to capacity and prices of each plant inquire of James Pryor, Houghton, Mich. Nov 12

WHITE OAK
TIMBERS, PLANK
AND
DIMENSION STOCK
F. S. SHURICK,
18 Broadway, NEW YORK CITY

For Sale.

Tug Duncan City. Address, Geo. Pankrantz Lumber Co., Sturgeon Bay, Wis. tf

Gasoline Engine for Sale.

For Sale Cheap—One 16-H. P. Superior gasoline engine. Used less than three months. Address Alpern & Co., Alpena, Mich. Nov. 12

Package Freight Steamers for Sale.

For Sale.—Steamers JOHN C. GAULT and RUSSELL SAGE; 1,200 tons capacity; complete fit out for package freight. Inland Lloyds rating, A2. Compound engines and two marine boilers in each boat; in fair condition. For particulars address A. W. Colton, Toledo, O. Oct 29

Tug for Sale.

Tug Warwick—Engine 15x17. Boiler allowed 110 lbs. steam. Both in first-condition. Hull practically new. Boat inspected and ready to run. Cheap for cash. Can be seen at Toledo, O. Apply to James Rooney, 1118 Collingwood ave., Toledo, O. tf

Boiler For Sale.

For sale cheap. Scotch marine boiler 10 ft. by 78 in triple riveted, ¾ steel plate, dome 6 ft by 24 in, 98 three inch tubes, stays ¾ center; allowed 168 lbs steam pressure. Boiler is now working and is as good as new. Address I. Applebaum, Detroit, Mich. tf

Small Steam Barge for Sale.

I have for sale a small steam barge. Carries 250 tons. Address, Capt F. E. Wood, Alexandria Bay, N. Y. tf



For Sale—A Bargain.

Two Brown Hoisting Machinery Company, all iron and steel, post jib cranes.

One 15-ton capacity 35 ft. 3 in. radius of hook, 18 ft. 6 in. lift.

One 3-ton capacity 19 ft. 8 in. radius of hook, 10 ft. 2 in. lift.

The hoisting mechanism of both cranes is driven by dust-proof motors. They are in excellent condition and have been very satisfactory machines.

A. GARRISON FOUNDRY COMPANY,
Oct. 29 Pittsburgh, Pa.

Steamer and Tow Barge for Sale.

Lake steamer and tow for sale. Total tonnage 1,000. Equipment complete. A-1 condition. Address, G. M., care Marine Review Pub. Co., 39-41 Wade Bldg., Cleveland, O. Nov. 12

Tug for Sale.

Length 75 ft., breadth 13.9 ft., depth 7.6 ft. Enquire H. Heinecke, Sheboygan, Wis. Oct. 29

Wanted Situation as Oiler.

Position wanted as oiler on lake vessel by party who is willing to work and anxious to get engineer's papers. Has had eight years' experience as stationary engineer. At present superintendent of a large steam plant. Can produce best of recommendations. Address Box 50, Marine Review Pub. Co., Cleveland. tf

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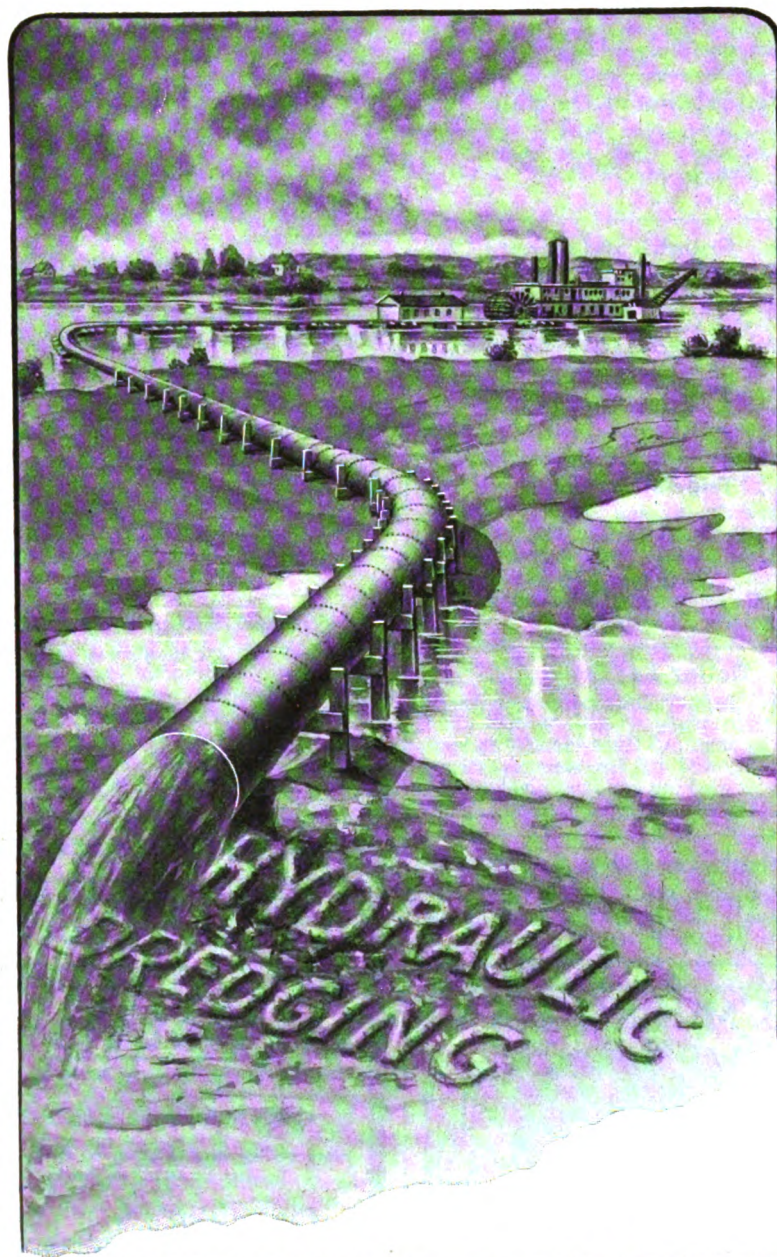
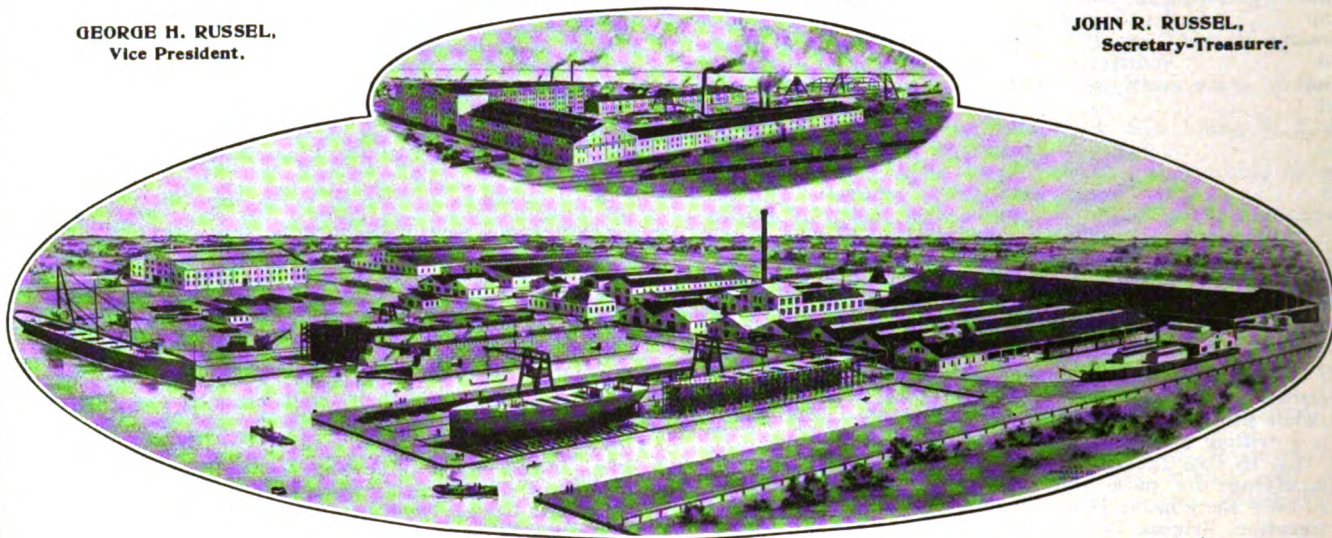
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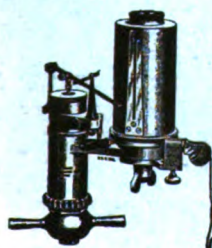
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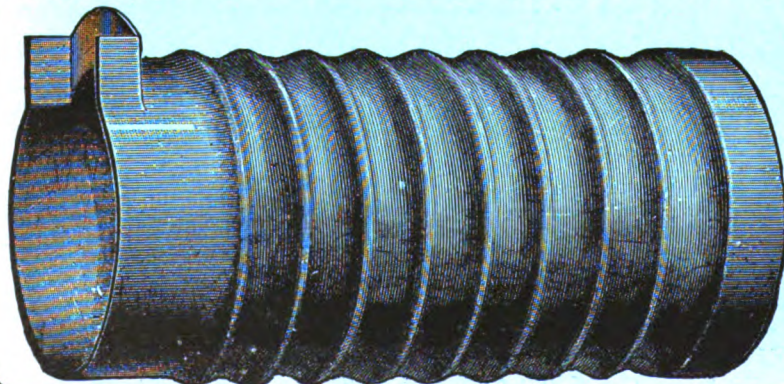
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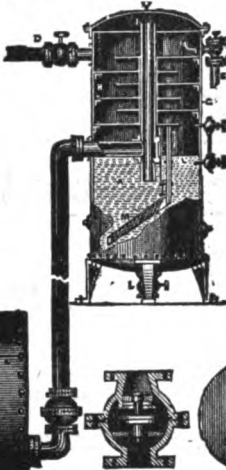
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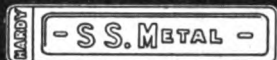
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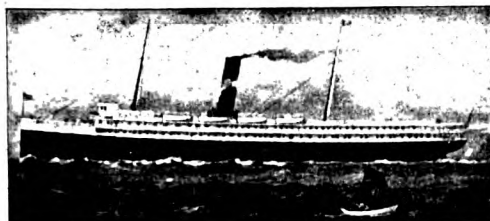
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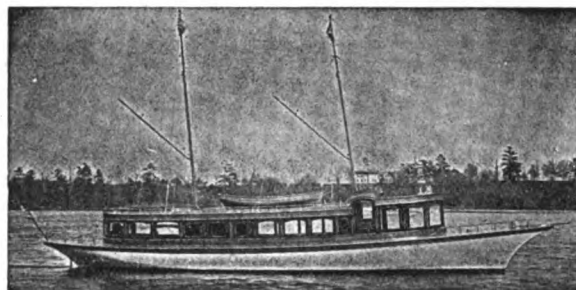
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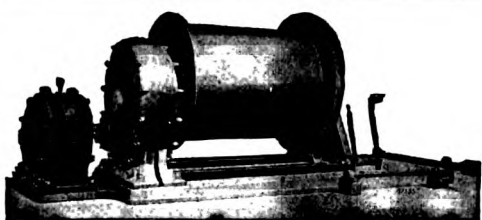
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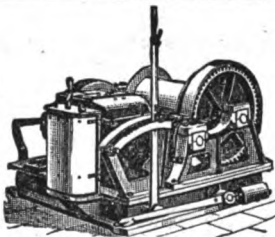
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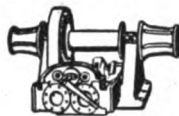
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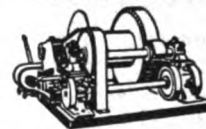
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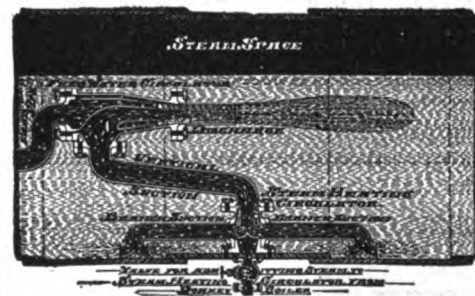
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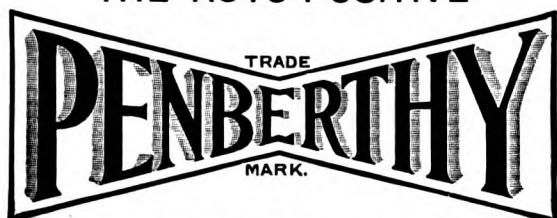
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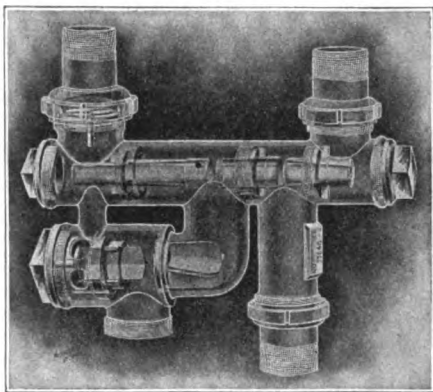
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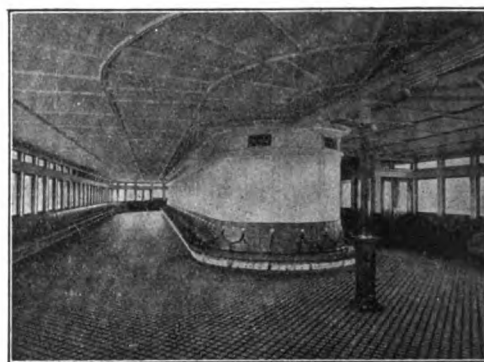
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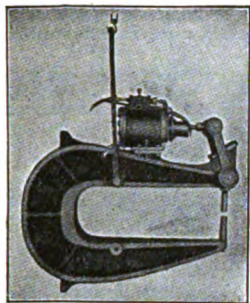
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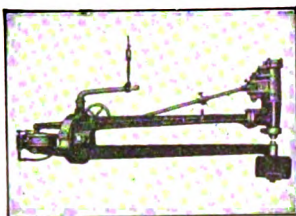


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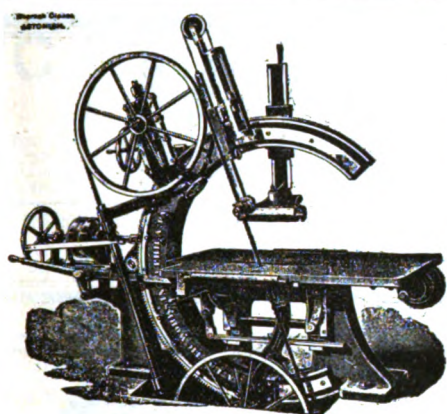
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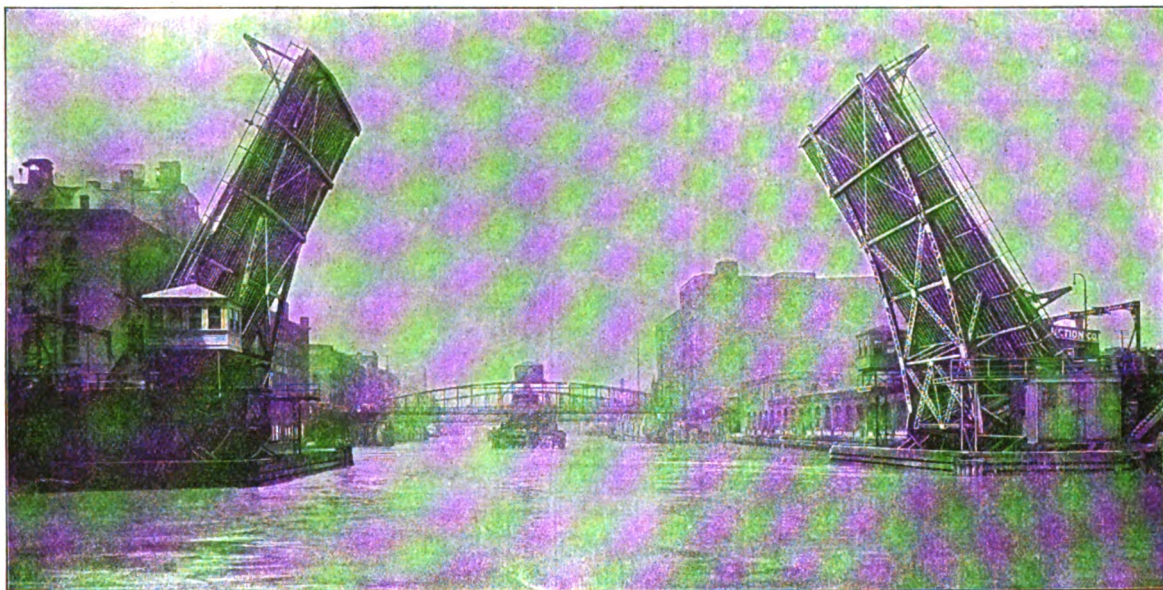
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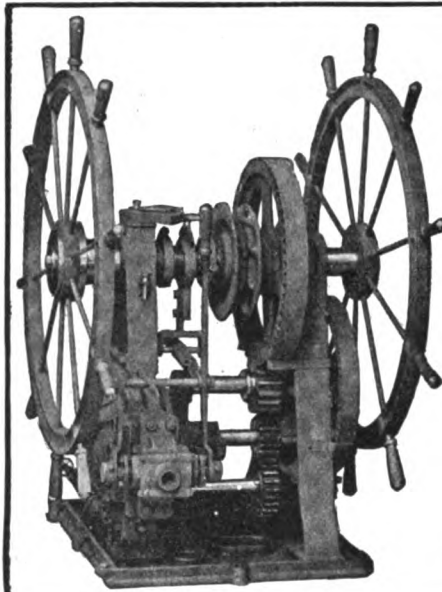


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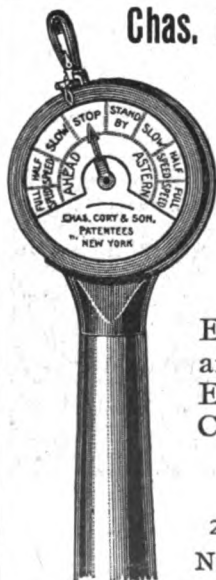
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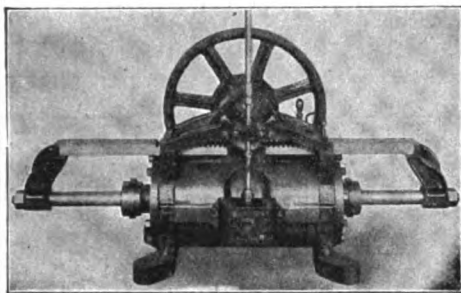
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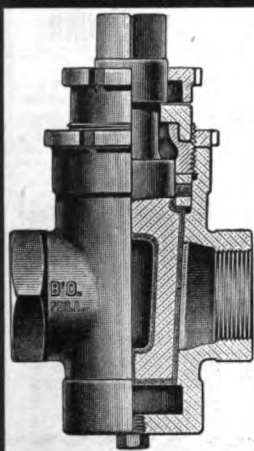
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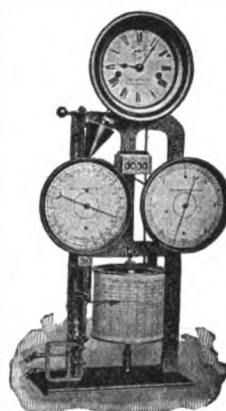
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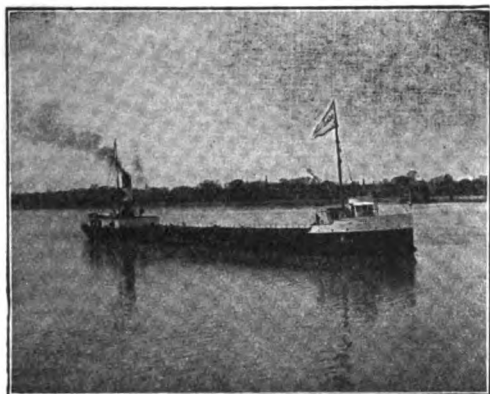
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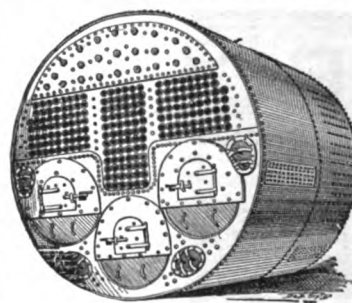
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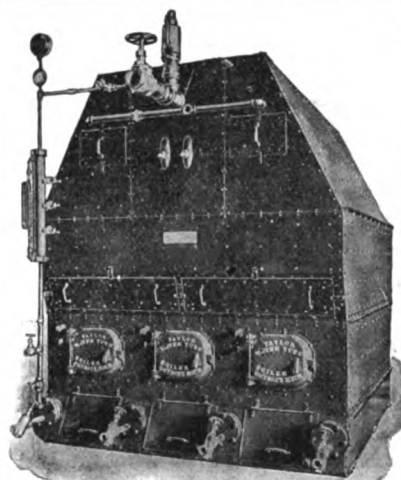
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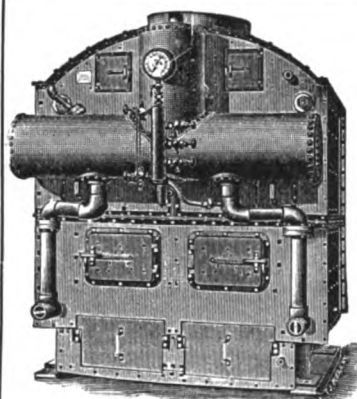
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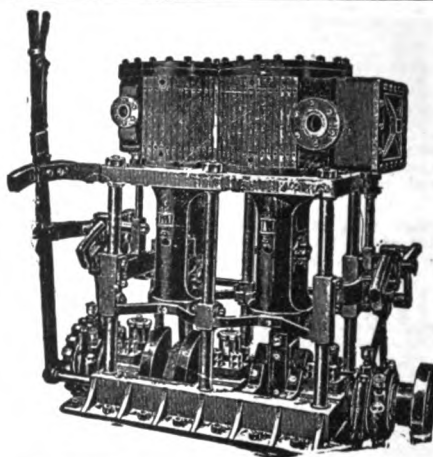
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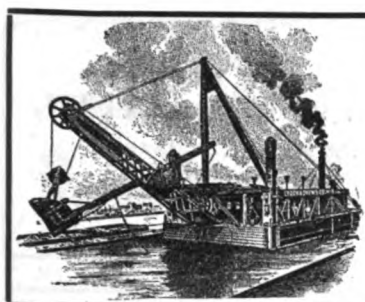
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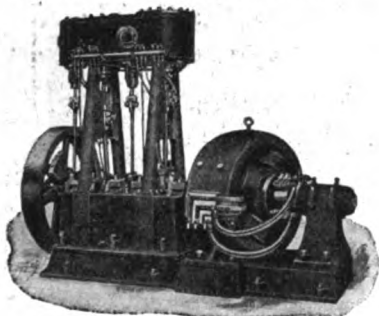
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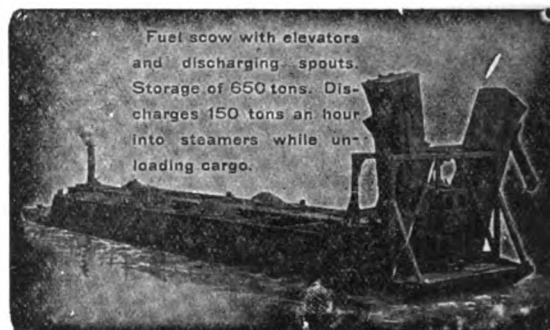
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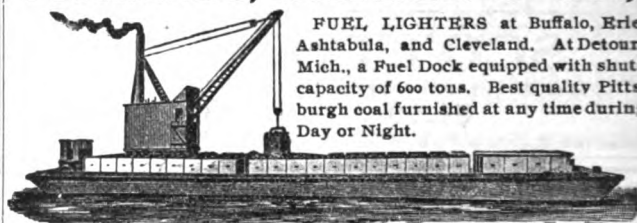
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Poe Lock, from below, open.

Poe Lock, from above.

Poe Lock, with Whaleback.

Weltzel Lock, from above.

Weltzel Lock, from below.

Str. North-Land Passing Locks, two views.

Upper Entrance to Lock Canal.

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GAS BUOYS.
Safety Car Heating & Lighting Co.New York.

GAS AND GASOLINE ENGINES.
Chase Machine Co.Cleveland.

GAUGES, STEAM AND VACUUM.
American Steam Gauge Co.Boston.
Ashton Valve Co.Boston.
Lunkenheimer Co.Cincinnati.

GRAPHITE.
Dixon Crucible Co., Joseph.Jersey City, N. J.
United States Graphite Co.Saginaw, Mich.

HAMMERS, STEAM.
Chase Machine Co.Cleveland.

HEATING APPARATUS.
Sturtevant, B. F. Co.Boston.

HOISTS FOR CARGO, ETC.
American Ship Building Co.Cleveland.
Brown Hoisting Machinery Co., (Inc.)Cleveland.
Chase Machine Co.Cleveland.
Elwell-Parker Electric Co.Cleveland.
General Electric Co.New York.
Hyde Windlass Co.Bath, Me.
Lidgerwood Mfg. Co.New York.
Marine Iron Co.Bay City.
Westinghouse Electric & Mfg. Co.Pittsburg, Pa.

HOLLOW STAYBOLT IRON.
Falls Hollow Staybolt Co.Cuyahoga Falls, O.

HOSE FITTINGS.
Farnan Brass Works.Cleveland.

HOSE, RUBBER.
New York Belting & Packing Co.New York.

HYDRAULIC DREDGES.
Great Lakes Engineering Works.Detroit.

HYDRAULIC TOOLS.
Watson-Stillman Co., The.New York.

ICE MACHINERY.
American Linde Refrigerating Co.New York.
Roelker, H. B.New York.

INDICATORS FOR STEAM ENGINES.
American Steam Gauge Co.Boston.
Ashton Valve Co.Boston.

INJECTORS.
American Injector Co.Detroit.
Crane Co.Chicago.
Jenkins Bros.New York.
Lunkenheimer Co.Cincinnati.
Peuberty Injector Co.Detroit, Mich.

INSURANCE, MARINE.
Brown & Co.Buffalo.
Elphicke, C. W. & Co.Chicago.
Fleming & Co., P. H.Chicago.
Hawgood & Co., W. A.Cleveland.
Helm & Co., D. T.Duluth.
Hutchinson & Co.Cleveland.
McCarthy, T. R.Montreal.
McCurdy, Geo. L.Chicago.
Mitchell & Co.Cleveland.
Pack, Chas. E. & W. F.New York and Chicago.
Richardson, W. C.Cleveland.
Sullivan, D. & Co.Chicago.
Weeks, F. H.New York.

IRON ORE AND PIG IRON.
Bourne-Fuller Co.Cleveland.
Hunna, M. A. & Co.Cleveland.
Pickands, Mather & Co.Cleveland.

LAUNCHES—STEAM, NAPHTHA, ELECTRIC.
Marine Construction & D. D. Co.St. Joseph, Mich.
Truscott Boat Mfg. Co.St. Joseph, Mich.
Warrington Iron Works.Chicago.
Willard, Chas. P.Chicago.

LIFE FLOATS.
Carley Life Float Co.New York.

LIFE PRESERVERS, LIFE BOATS, BUOYS.
Armstrong Cork Co.Pittsburg.
Carley Life Float Co.New York.
Drein, Thos. & Son.Wilmington, Del.
Kuhnweiller's Sons, D.New York.
Lane & DeGroot.Long Island City, N. Y.
Marine Construction & Dry Dock Co.Chicago.
Mariner's Harbor, S. I., N. Y.
Ripley Hardware Co.Grafton, Ill.

LIGHTS, SIDE AND SIGNAL.
Helvig, H. A. J.New York.
Russell & Watson.Buffalo.

LOGS.
Bliss, John & Co.New York.
Nicholson Ship Log Co.Cleveland.
Walker & Sons, Thomas.Birmingham, Eng.
Also Ship Chandlers.

LUBRICATING GRAPHITE.
Dixon Crucible Co., Joseph.Jersey City, N. J.
United States Graphite Co.Saginaw, Mich.

LUMBER.
Martin-Barriss Co.Cleveland.
Moran Bros. Co.Seattle, Wash.
Shurick, F. S.New York.

MACHINISTS.
Chase Machine Co.Cleveland.
Lockwood Mfg Co.East Boston, Mass.
Macbeth Iron Co.Cleveland.
Union Machine & Boiler Co.Cleveland.

MACHINE TOOLS (WOOD WORKING).
Atlantic Works, Inc.Philadelphia.

MARINE RAILWAYS, BUILDERS OF
Crandall & Son, H. I.East Boston, Mass.

MATTRESSES, CUSHIONS, BEDDING.
Fogg, M. W.New York.

MECHANICAL DRAFT FOR BOILERS.
American Ship Building Co.Cleveland.
Bloomsburg & Co., H.Baltimore, Md.
Detroit Ship Building Co.Detroit.
Sturtevant, B. F. Co.Boston.

METALLIC PACKING.
Hayden Mfg. Co., N. L.Columbus, O.
Katzenstein, L. & Co.New York.
U. S. Metallic Packing Co.Philadelphia.

METAL POLISH.
Bertram's Oil Polish Co.Boston.

MOTORS, GENERATORS—ELECTRIC.
Electro-Dynamic Co.Philadelphia.
Elwell-Parker Electric Co.Cleveland.
General Electric Co.Schenectady, N. Y.
Sturtevant, B. F. Co.Boston.
Westinghouse Electric & Mfg. Co.Pittsburg, Pa.

NAUTICAL INSTRUMENTS.
Bliss, John & Co.New York.
Kitchie, E. S. & Sons.Brookline, Mass.

NAUTICAL SCHOOLS.
Chicago Nautical School.Chicago.
Seattle Nautical School.Seattle, Wash.

NAVAL ARCHITECTS.
Gaskin, Edward.Buffalo.
Kidd, Joseph.Duluth, Minn.
Logan, Robert.Cleveland.
Matteson & Drake.Philadelphia.
Mosher, Chas. D.New York.
Newman, R. L.New York.
Sadler, Perkins & Field.New York.
Wood, W. J.Chicago.

OAKUM.
DeGrauw, Aymar & Co.New York.
Stratford Oakum Co.Jersey City, N. J.

OIL FOR PAINTING.
Sipe & Co., James B.Allegheny, Pa.

OILS AND LUBRICANTS.
Dixon Crucible Co., Joseph.Jersey City, N. J.
Standard Oil Co.Cleveland.
United States Graphite Co.Saginaw, Mich.

PACKING.
Crane Co.Chicago.
Hayden Mfg. Co., N. L.Columbus, O.
Jenkins Bros.New York.
Katzenstein, L. & Co.New York.
New York Belting & Packing Co.New York.
United States Metallic Packing Co.Philadelphia.

PAINTS.
Brker, Howard H. & Co.Buffalo.
Detroit Varnish Co.Detroit.
Detroit White Lead Works.Detroit.
Mohawk Paint & Chemical Co.Norwich, Conn.
New Jersey Zinc Co.New York.
Sipe & Co., James B.Allegheny, Pa.
United States Graphite Co.Saginaw, Mich.
Upson-Walton Co.Cleveland.

PATENT ATTORNEYS.
Thurston & Bates.Cleveland.

PATTERN SHOP MACHINERY.
Atlantic Works, Inc.Philadelphia.

PIPE—BRASS AND COPPER, IRON PIPE SIZE.
Waterbury Brass Co.New York.

PIPE-JOINT COMPOUND.
United States Graphite Co.Saginaw, Mich.

PIPE, WROUGHT IRON.
Bourne-Fuller Co.Cleveland.
Crane Co.Chicago.
Macbeth Iron Co.Cleveland.

PLANING MILL MACHINERY.
Atlantic Works, Inc.Philadelphia.

PLATES—SHIP, STRUCTURAL, ETC.
Bourne-Fuller Co.Cleveland.

PLUMBING, MARINE.
Reilly Repair & Supply Co., James.New York.
Sands, Alfred B. & Son.New York.

PNEUMATIC TOOLS.
Allen, John F.New York.

POLISH FOR METALS.
Bertram's Oil Polish Co.Boston.

BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

PRESSURE REGULATORS.

Kieley & MuellerNew York.
Ross Valve Co.Troy, N. Y.

PROPELLER WHEELS.

American Ship Building Co.Cleveland.
Atlantic Works.East Boston, Mass.
Bath Iron Works, Ltd.Bath, Me.
Cramp, Wm. & Sons.Philadelphia.
Crescent Ship Yard Co.Elizabethport, N. J.
Detroit Ship Building Co.Detroit.
Fore River Ship & Engine Co.Quincy, Mass.
Great Lakes Engineering Works.Detroit.
Hyde Windlass Co.Bath, Me.
Jenks Ship Building Co.Port Huron, Mich.
Lockwood Mfg. Co.East Boston, Mass.
Muebeth Iron Co.Cleveland.
Maryland Steel Co.Sparrow's Point, Md.
Milwaukee Dry Dock Co.Milwaukee.
Moran Bros. Co.Seattle, Wash.
Newport News Ship Building Co.Newport News, Va.
Phosphor Bronze Smelting Co., Ltd.Philadelphia.
Ridson Iron Works.San Francisco.
Roelker, H. B.New York.
Sheriffs Mfg. Co.Milwaukee.
Superior Shipbuilding Co.Superior, Wis.
Thropp & Sons Co., J. E.Trenton, N. J.
Trout, H. G.Buffalo.
United States Ship Building Co.New York.

PROJECTORS, ELECTRIC.

Elwell-Parker Electric Co.Cleveland.
General Electric Co.Schenectady, N. Y.
Westinghouse Electric & Mfg. Co.Pittsburg, Pa.

PUMPS FOR VARIOUS PURPOSES.

Blake, Geo. F., Mfg. Co.New York.
Great Lakes Engineering Works.Detroit.
Kingsford Foundry & Machine Wks. Oswego, N. Y.
"Long-Arm" System Co.Cleveland.

PUNCHES, RIVETERS, SHEARS.

Allen, John F.New York.

REFRIGERATING APPARATUS.

Roelker, H. B.New York.

REGISTER FOR CLASSIFICATION OF VESSELS.

Great Lakes RegisterCleveland
Record of American & Foreign Shipping.New York.

RIVETING MACHINES.

Allen, John F.New York.

RIVETS, STEEL, FOR SHIPS AND BOILERS.

Bourne-Fuller Co.Cleveland.

RANGES.

Russell & WatsonBuffalo.

RIVETS—BRASS AND COPPER.

Waterbury Brass Co.New York.

SAFETY VALVES.

American Steam Gauge Co.Boston.
Ashton Valve Co.Boston.
Crane Co.Chicago.
Hayden Mfg. Co., N. L.Columbus, O.
Lunkenheimer Co.Cincinnati.

SAIL MAKERS.

Baker, Howard H. & Co.Buffalo.
Upson-Walton Co.Cleveland.
Wilson & SlisbyBoston.

SALVAGE COMPANIES.

See Wrecking Companies.

SCHOOLS, NAUTICAL.

Chicago Nautical SchoolChicago.
Seattle Nautical SchoolSeattle, Wash.

SEARCH LIGHTS.

Elwell-Parker Electric Co.Cleveland.
General Electric Co.Schenectady, N. Y.
Westinghouse Electric & Mfg. Co.Pittsburg, Pa.

SHEARS.

See Punches, Rivets, and Shears.

SHIP AND BOILER PLATES AND SHAPES.

Bourne-Fuller Co.Cleveland.

SHIP BUILDERS.

American Ship Building Co.Cleveland.
Atlantic Works.East Boston, Mass.
Bath Iron Works, Ltd.Bath, Me.
Buffalo Dry Dock Co.Buffalo.
Cramp, Wm. & Sons.Philadelphia.

Craig Ship Building Co.Toledo, O.
Chicago Ship Building Co.Chicago.
Crescent Ship Yard Co.Elizabethport, N. J.
Detroit Ship Building Co.Detroit.
Fore River Ship & Engine Co.Quincy, Mass.
Great Lakes Engineering Works.Detroit.
Jenks Ship Building Co.Port Huron, Mich.
Lockwood Mfg. Co.East Boston, Mass.
Maulitowoc Dry Dock Co.Manitowoc, Wis.
Marine Construction & Dry Dock Co.
.....Mariner's Harbor, S. I., N. Y.
Maryland Steel Co.Sparrow's Point, Md.
Milwaukee Dry Dock Co.Milwaukee.
Moran Bros. Co.Seattle, Wash.
Newport News Ship Building Co.Newport News, Va.
Ridson Iron Works.San Francisco.
Roach's Ship Yard.Chester, Pa.
Shipowners Dry Dock Co.Chicago.
Smith & Son, Abram.Algonac, Mich.
United States Ship Building Co.New York.
Warrington Iron Works.Chicago.
Willard, Chas. P. & Co.Chicago.

SHIP CHANDLERS.

Baker, Howard H. & Co.Buffalo.
Moran Bros. Co.Seattle, Wash.
Reilly Repair & Supply Co., James.New York.
Upson-Walton Co.Cleveland.

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Helvig, H. A. J.New York.
Russell & WatsonBuffalo.

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Moran Bros. Co.Seattle, Wash.
Shurick, F. S.New York.

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Smooth-On Mfg. Co.Jersey City, N. J.

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STAYBOLTS, IRON OR STEEL, HOLLOW, OR SOLID.

Falls Hollow Staybolt Co.Cuyahoga Falls, O.

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Holmes, Samuel.New York.
King, Rufus S.New York.
McCarthy, T. R.Montreal, Can.
Newman, R. L.New York.
Weeks, F. H.New York.

STEAMSHIP LINES, PASS. AND FREIGHT.

American LineNew York.
Cleveland & Buffalo Transit Co.Cleveland.
Erle & Western Trans. Co.Buffalo.
Goodrich Trans. Co.Chicago.
International Mercantile Marine Co.Philadelphia.
Pere Marquette R. R. & S. S. Line.Milwaukee.
Red Star LineNew York.

STEEL CASTINGS.

Seaboard Steel Casting Co.Chester, Pa.
Macbeth Iron Co.Cleveland.

STEERING APPARATUS.

American Ship Building Co.Cleveland.
Chase Machine Co.Cleveland.
Dake Engine Co.Grand Haven, Mich.
Detroit Ship Building Co.Detroit.
Hyde Windlass Co.Bath, Me.
Jenks Ship Building Co.Port Huron, Mich.
Moulton Steering Engine Co.New York.
Sheriffs Mfg. Co.Milwaukee.

STOCKS, BONDS, SECURITIES.

Fahey & Co.Cleveland.

SUBMARINE DIVING APPARATUS.

Morse & Son, A. J.Boston.
Schrader's Son, A.New York.

SURVEYORS, MARINE.

Gaskin, EdwardBuffalo.
Matteoson & DrakePhiladelphia.
Newman, R. L.New York.
Wood, W. J.Chicago.

TESTS OF MATERIALS.

Hunt, Robert W. & Co.Chicago.
Pittsburg Testing Laboratory Ltd.Pittsburg.

TILING, INTERLOCKING RUBBER.

New York Belting & Packing Co.New York.

TOOLS, METAL WORKING, FOR SHIP AND ENGINE WORKS.

Allen, John F.New York.
Watson-Stillman Co.New York.

TOOLS, WOOD WORKING.

Atlantic Works, Inc.Philadelphia.

TOWING MACHINES.

American Ship Windlass Co.Providence, R. I.
Chase Machine Co.Cleveland.

TOWING COMPANIES.

Donnelly Salvage & Wrecking Co.Kingston, Ont.
Midland Towing & Wrecking Co., Ltd.Midland, Ont.

TRAPS, STEAM.

Kieley & MuellerNew York.
Lunkenheimer Co.Cincinnati.
Sturtevant Co., B. F. Jamaica Plain.Boston.

TRUCKS.

Boston & Lockport Block Co.Boston.

TUBING, SEAMLESS.

Shelby Steel Tube Co.Pittsburg, Pa.
Waterbury Brass Co.New York.

VALVES, STEAM SPECIALTIES, ETC.

American Steam Gauge Co.Boston.
Ashton Valve Co.Boston.
Bordo, L. J.Philadelphia.
Crane Co.Chicago.
Hayden Mfg. Co., N. L.Columbus, O.
Jenkins Bros.New York.
Kieley & MuellerNew York.
Lunkenheimer Co.Cincinnati.
Ross Valve Co.Troy, N. Y.

VALVES FOR WATER AND GAS.

Ross Valve Co.Troy, N. Y.

VARNISHES.

Detroit Varnish Co.Detroit.
Detroit White Lead Works.Detroit.
New Jersey Zinc Co.New York.
Also Ship Chandlers.

VESSEL AND FREIGHT AGENTS.

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Brown & Co.Buffalo.
Elwell, Jas. W. & Co.New York.
Elphicke, O. W. & Co.Chicago.
Fleming & Co., P. H.Chicago.
Hall & RootBuffalo.
Helm & Co., D. T.Duluth.
Hawgood & Co., W. A.Cleveland.
Holmes, Samuel.New York.
Hutchinson & Co.Cleveland.
King, Rufus S.New York.
McCarthy, T. R.Montreal.
Newman, R. L.New York.
Mitchell & Co.Cleveland.
Richardson, W. C.Cleveland.
Sullivan, D. & Co.Chicago.
Weeks, F. H.New York.

VENTILATING APPARATUS FOR SHIPS.

Sturtevant, B. F. Co.Boston.

WIRE—BRASS AND COPPER.

Waterbury Brass Co.New York.

WIRE ROPE AND WIRE ROPE FITTINGS.

Baker, H. H. & Co.Buffalo.
DeGrauw, Aymar & Co.New York.
Upson-Walton Co.Cleveland.

WHISTLES, STEAM.

American Steam Gauge Co.Boston.
Ashton Valve Co.Boston.
Lunkenheimer Co.Cincinnati.

WHITE METAL—SHEETS, RODS AND WIRE.

Waterbury Brass Co.New York.

WINDLASSES.

American Ship Windlass Co.Providence, R. I.
American Ship Building Co.Cleveland.
Hyde Windlass Co.Bath, Me.
Jenks Ship Building Co.Port Huron, Mich.

WINCHES.

American Ship Windlass Co.Providence, R. I.
Hyde Windlass Co.Bath, Me.

WOOD WORKING MACHINERY.

Atlantic Works, Inc.Philadelphia.

WRECKING AND SALVAGE COMPANIES.

Donnelly Salvage & Wrecking Co.Kingston, Ont.
Midland Towing & Wrecking Co., Ltd.Midland, Ont.

YACHT AND BOAT BUILDERS.

Drain, Thos. & SonWilmington, Del.
Lane & DeGrootLong Island City, N. Y.
Marine Construction & Dry Dock Co.New York.
Rippley Hardware Co.Grafton, Ill.
Truscott Boat Mfg Co.St. Joseph, Mich.
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Eastward.	Arrive from West Depart East.
No. 18, Southwestern Lim 1:30am
No. 22, Lake Shore Lim.....	*2:12am *2:30am
No. 20, Chi & Cleve Ex.....	*7:20am
No. 28, N Y & Bost Ex.....	*7:40am *8:00am
No. 40, Toledo & Buff Ac.....	*10:00am *10:40am
No. 32, Fast Mail 1	*11:25am *11:30am
No. 44, Ac via Sandusky.....	*1:40pm
No. 46, Southwestern Ex.....	..... *3:00pm
No. 116, Conneaut Accom	..... *4:30pm
No. 6, Lim Fast Mail.....	*5:40pm *5:45pm
No. 26, 20th Cent Lim.....	*7:40pm *7:43pm
No. 10, C. N Y & B Sp.....	*7:50pm *7:50pm
No. 16, New Eng Ex.....	*10:30pm *10:35pm
No. 2, Day Express.....	*9:10pm *9:25pm
No. 126, Norwalk Accom.....	*7:40am
Westward.	Arrive from East Depart West.
No. 11, Southwestern Lim	*3:25am
No. 7, Day Express.....	..... *6:00am
No. 15, Bost & Chi Sp.....	*3:05am *3:15am
No. 19, Lake Shore Lim.....	*7:05am *7:15am
No. 23, Western Express.....	*10:30am *10:35am
No. 29, Southwestern Sp.....	*11:10am
No. 33, Southwestern Ex.....	*12:25pm
No. 133, Cleve & Det Ex.....	..... *12:45pm
No. 47, Accommodation.....	*11:00am *13:00pm
No. 141, Sandusky Accom.....	..... *3:10pm
No. 43, Fast Mail 1	*4:35pm *4:40pm
No. 127, Norwalk Accom.....	..... *5:10pm
No. 37, Pacific Express.....	*7:00pm *7:20pm
No. 3, Fast Mail Lim.....	*10:50pm *10:55pm
No. 115, Conneaut Accom.....	*8:30am
*Daily. †Except Sunday. ‡Except Monday.	
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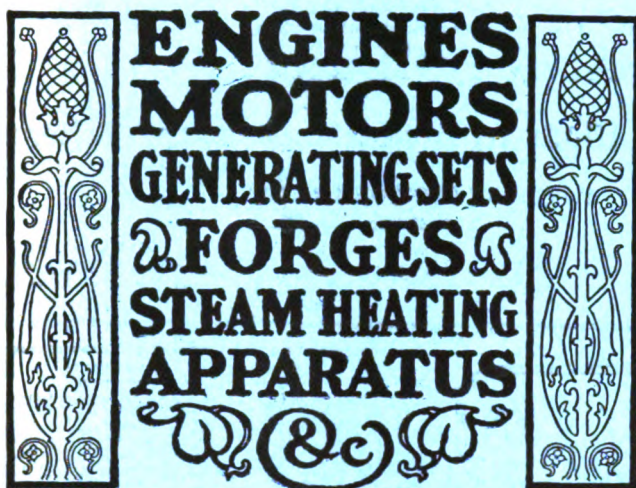
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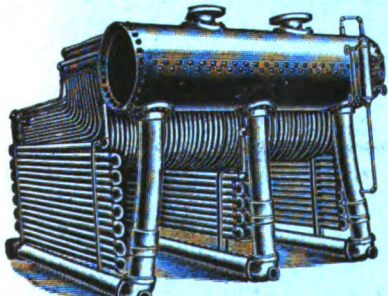
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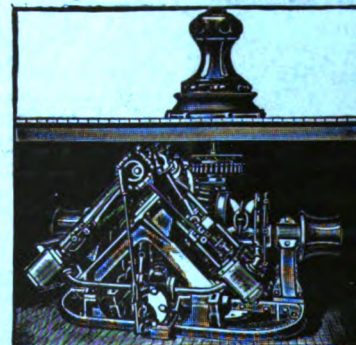
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